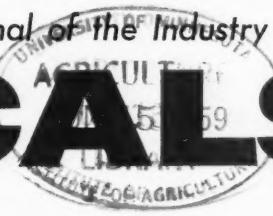


FARM CHEMICALS

June Volume 122 No. 6 50 Cents

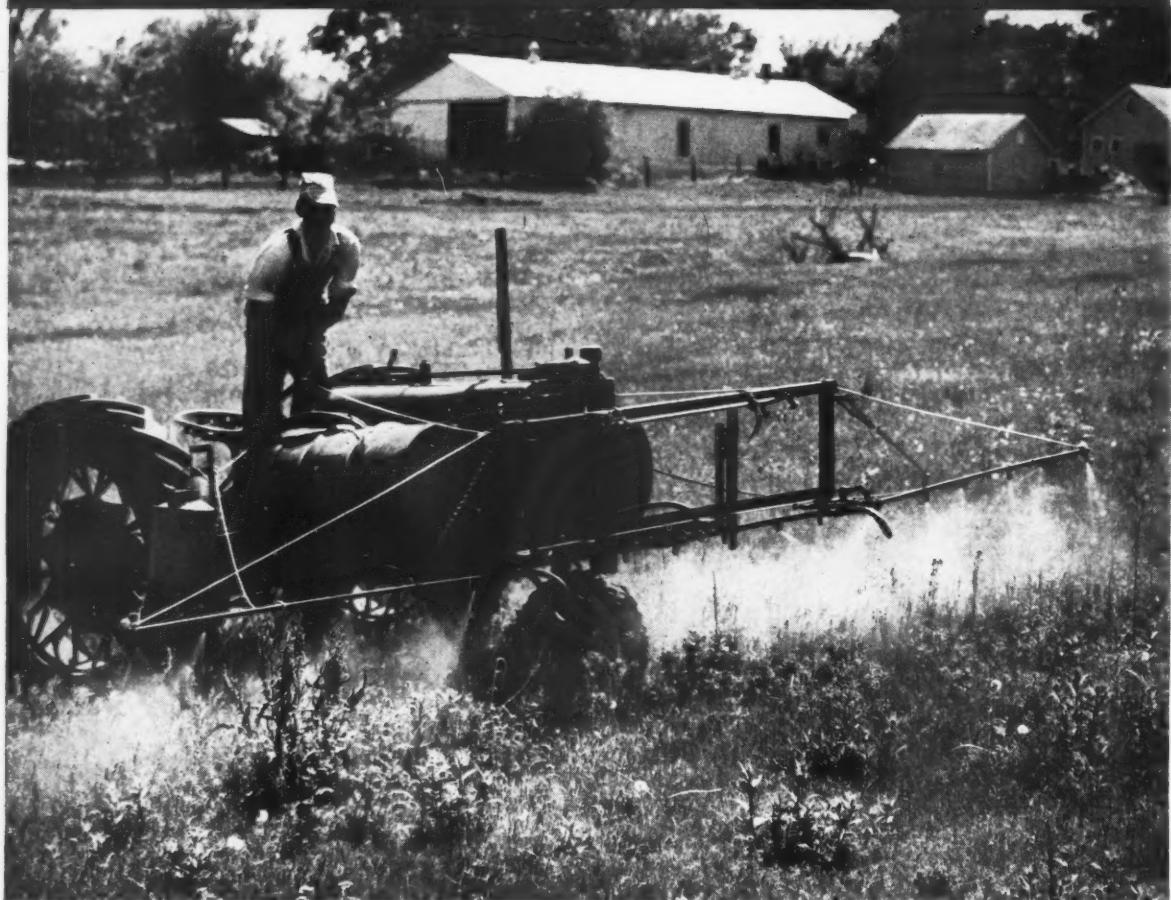
Pioneer Journal of the Industry



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13-59

fertilizer industry goals rate priority planning at SOHIO

SOHIO's success depends upon a healthy, vigorous fertilizer industry. That's one of the reasons why Sohio lends full support to activities that will benefit and strengthen fertilizer manufacturers.

Membership in the National Plant Food Institute . . . and encouraging acceptance of the following goals . . . are examples of this support.

- Improvements in fertilizer technology and a better understanding of new developments in manufacturing processes.
- Advances in chemical control methods to match continuing dynamic changes in the fertilizer industry.
- Educational and public relations programs that benefit both the fertilizer industry and agriculture.
- Encouraging research in soil science, agronomy, fertilizer economics and related fields.

These goals have always rated priority planning at Sohio. We feel that gearing our programs to match the needs of the fertilizer manufacturers has been a big factor in our growth and expansion.

And it's the reason we will continue to give priority planning to the development of improved nitrogen products, services and activities that will benefit fertilizer manufacturers . . . and the entire industry . . . today and in the future.

Call the "Man from Sohio" for details on Sohio SERVICE, and a complete line of nitrogen materials: high-quality anhydrous ammonia . . . aqua ammonia . . . 45% coated or uncoated 46% urea . . . 18 nitrogen solutions, including all urea types.

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"Great, Bill...this SPM pr



... it took Bill
just 15 minutes
to review the
Sul-Po-Mag program
and magnesium story.

Alf Oines (right), and Bob Freske (center), president and vice-president of the Michiana Chemical Co., of Niles, Michigan, will continue to profit from the SPM program. They're shown here with Bill Lane, IMC Potash sales representative.



3. "Bill, you may recall that we recently used various elements of your program . . . mailers, envelope stuffers . . . and found them very helpful in pushing our own brand. And we may want to take advantage of your imprinting service on some of the other materials."

4. "Here are examples of our Sul-Po-Mag editorial ads that are being run in farm publications this year. Each ad creates awareness of a need for magnesium . . . tells farmers the name of the product that corrects or prevents it . . . and displays the seal as the sign of Sul-Po-Mag."

Ask your IMC potash representative how the Sul-Po-Mag seal program can help boost your fertilizer sales

From its start several years ago, International's Sul-Po-Mag sales program has rapidly gained momentum. Sul-Po-Mag is well accepted as the ingredient in your mixed fertilizers to prevent and help correct magnesium deficiencies.

The SPM program is supported by full-scale national and local informational and product advertising. Ads written for specific crops are directed to growers throughout the nation. Growers of tobacco, potatoes, fruits and vegetables are all receiving SPM information. These magazine ads are backed up by radio commercials, direct mail, and publicity. Also, a large amount of work is being done to promote magnesium through influence groups such as county agents, vo-ag teachers and agricultural extension people.

The net effect . . . growers and influence groups are becoming more acquainted with the growing problem of magnesium deficiency. Sul-Po-Mag is widely recognized as the best way to combat magnesium shortages. As a result more and more growers are looking for the SPM seal on the mixed fertilizers they buy.

Fertilizer manufacturers using Sul-Po-Mag can take advantage of this promotion by identifying themselves and their products with newspaper ad mats, tags, seal imprints, imprinted direct mail pieces and posters . . . all available at no cost. For full information on the SPM program — and for information on IMC's full line of potash products — contact your International representative or write c/o the address at right.

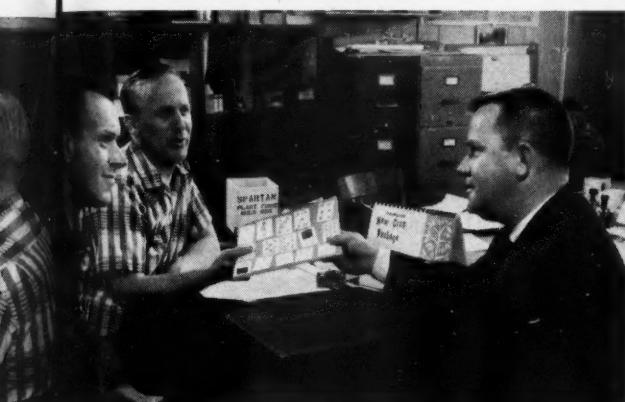
M program should really help sales!"



"The SPM informational advertising program has made a terrific impact on the market. As an example, we've received requests for product information from thousands of large growers and influence people. It indicates to us that growers are becoming more and more interested in magnesium."



2. "Although our advertising is primarily informational, we use the seal in each ad to acquaint buyers with the sign that identifies fertilizer with Sul-Po-Mag. As you know the SPM seal is available in printing plates, proofs, stickers, or tags so you can take advantage of our Sul-Po-Mag promotion."



"Sounds interesting, Bill . . . but could you leave this brochure with us? We would like to look it over and study your program in detail. I'm sure your materials may fit into our own advertising program."



By including Sul-Po-Mag as your source of magnesium and sulphate of potash in your mixed fertilizers, you'll profit from this hard-working sales promotion campaign.



6. "Thanks for your time, Alf and Bob. I'll keep you informed on everything new in our program, but if you have any questions or would like to use some materials, just let me know."

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26-59 R

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EDITORIAL DIRECTOR

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MEMBER BUSINESS PUBLICATIONS AUDIT

The national business magazine for the fertilizer and pesticide industries, **FARM CHEMICALS**, serves primarily those persons responsible for management, marketing and production. It has a qualified circulation for selected executive and supervisory persons within specified segments of these industries, as well as in certain closely allied fields. Subscription rates to all others are: in the U.S., its possessions, Canada, Cuba and Panama: \$6.00; in other countries: \$7.50. Single copy 50 cents. Established in 1894 as *The American Fertilizer*.

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Vol. 122 No. 6 June 1959

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THE COVER PICTURE

When Sohio Chemical Company launched their recent "Operation Fertilizer Salesman's Handbook," (see feature article on page 30), they asked agricultural leaders what they especially liked about the manual. These representatives of agricultural agencies in Lima not only told them, but they gladly posed for a picture. Left to right: Cal Leimbach, county extension agent; H. H. "Bert" Tucker of Sohio; John Starling, vo-ag teacher, and Lee Borton, work unit conservationist, SCS.

Farm Chemicals Photo, courtesy of Sohio Chemical Co.

FREE OF CHARGE

NEW MANUAL on Ammonia and Nitrogen Solutions

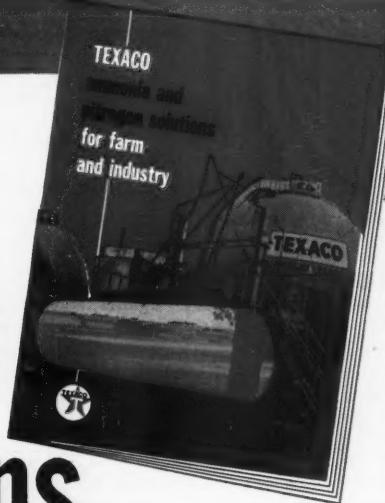


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Our supply of these valuable new manuals may be exhausted quickly, so write for your free copy immediately. Send your request to Texaco Inc., Petrochemical Sales Division, 135 East 42nd Street, New York 17, N.Y.

LETTERS

F
C

EDUCATION THROUGH SERVICE

New Brunswick, N. J.

This is to congratulate you on the greatly improved appearance and content of **FARM CHEMICALS**. I see no reason why this journal should not enjoy an ever more prominent place in the agricultural chemical field.

In this connection I want to comment on the editorial in the April issue in which you write: "It's time that the industry itself assumes more and more the functions of education through service."

For the past decade I have been saying essentially the same thing to the agricultural limestone industry. In a memorandum to the editor of *Rock Products* dated February 28, 1957 I wrote:

"The agricultural limestone industry is a waste-product enterprise. The industry sells its primary products to other industries, builders and roadmakers. Then it asks the government to help it give away what is left. Meanwhile the fertilizer industry goes right ahead with its sales and service program without government aid. In fact, it has the Tennessee Valley Authority (TVA) as a troublesome governmental competitor."

"Within limits, fertilizer can be substituted for liming materials in soils. This applies particularly to phosphate fertilizers. And apparently something like this is happening. Otherwise sales of liming materials would be increasing, as they should. But they won't increase to any very marked degree until salesmanship and service are applied to them."

One of our greatest shortcomings is our failure to develop a long-time constructive approach to problems that are here to stay.

We will always have a fertilizer industry. It will get bigger and bigger of necessity. And it will become of ever greater importance to the people of this country. The industry must run its own business, and that is no small job. And somebody at the top of it, with special insight into the future, should be spending all his time trying to determine just where the industry will need to be 25, 50 and 100 years from now.

With best wishes for your continued success, both with **FARM CHEMICALS** and with COUNTY AGENT-VO-AG TEACHER as well, I am

Sincerely yours,
FIRMAN E. BEAR
Editor-in-Chief
SOIL SCIENCE

A PACKAGE DEAL

Columbia, Mo.

I read with interest several of the articles in the April issue of **FARM CHEMICALS**. I am complimented that you thought a part of my talk merited space in your paper.

I believe the most effective step toward greater use of fertilizer would be the development of a "package deal"—in which

the man who called on the farmer, or talked with him at the plant or store, could (1) tell him what he could expect from fertilizer properly selected and used, (2) arrange the details necessary to a representative soil test—sampling, analyses, interpretation, and so forth—(3) sell him the fertilizer he needs or arrange for its sale and application, if he so desires, (4) arrange for the credit required on terms to fit his needs.

The people who sell this farmer automobiles, farm machinery and even his furniture and household equipment and so forth do this and find that it increases their sales and profits. It certainly should work and the sale of a commodity like fertilizer can be expected to pay for itself two or three times over in a single year.

Yours very truly,
GORDON B. NANCE
Professor, Agricultural Economics
College of Agriculture
UNIVERSITY OF MISSOURI

THE SERIES ON SELLING

Baltimore 15, Md.

We liked the article in your May 1959 issue by Ted Pollock entitled "Secrets of Persuasion."

We would like to have fifty (50) reprints of this article for distribution to our sales force. We would also like to have the same number of reprints on future articles in this series.

You may bill us for the cost of the reprints.

Very truly yours,
ROGER W. COHILL
General Sales Manager
MILLER CHEMICAL &
FERTILIZER CORP.

ON STORED GRAIN INSECT CONTROL

Manhattan, Kans.

Mr. Lee Wilcox should be congratulated on his stored grain insect control article in the April issue of **FARM CHEMICALS**. I especially appreciate seeing this material presented in a comprehensive manner without deviating from the basic ideas presented in the original material.

I have written to your Readers' Service Department for two publications of interest to me. I would expect this service to be of extreme value to your readers.

Would it be possible to obtain a few reprints of the stored grain insect control article presented in **FARM CHEMICALS**?

Sincerely,
PHILLIP K. HAREIN
Instructor, Dept. of Entomology
KANSAS STATE COLLEGE

Manhattan, Kans.

... I always find it worthwhile and enjoyable to read your publication.

I am especially pleased when I see an

article such as the one prepared by Mr. Wilcox. (Stored Grain Insect Control, April issue). The spreading of that kind of information is a highly important and commendable service to your readers.

If you have a few extra reprints of the article on Stored Grain Insect Control, I would appreciate receiving them.

Respectfully yours,
KEITH WHITNEY
Instructor of Entomology
KANSAS STATE UNIVERSITY

Beltsville, Md.

We have read with interest your special report on "Stored Grain Insect Control", and if reprints of this article are available we would like to receive about 15 copies. However, if your supply of reprints is limited, we shall appreciate receiving as few as 2 or 3 copies for our reference file.

Very truly yours,
L. S. HENDERSON, Head
Stored-Product Insects Section
Biological Sciences Branch
Marketing Research Div.,
Agr. Marketing Service, USDA

THE LIQUIDS ARTICLE

South Solon, Ohio

... I was favorably impressed with the magazine as a whole and particularly interested in the article on the liquid fertilizer industry. I thought this article was excellent and gave a pretty accurate picture of the liquid industry as it exists today.

Yours truly,
O. L. OHNSTAD
President
OHIO LIQUID FERTILIZER, INC.

Boynton Beach, Fla.

In your April issue you have an article on Marketing Complete Liquids. We would like to get copies of this if you have them and if not I would like permission to reproduce this article.

It is exceptionally informative and I know it would be of great interest to our stockholders, if I can obtain copies for them . . .

Very truly yours,
BRYCE W. STRACHAN
SOUTHLAND LIQUID
FERTILIZER CO.

SPECIALIZED EQUIPMENT

Meredosia, Ill.

Referring to your April Vol. 122 No. 4—the article on page 40—Materials Handling, Custom Application, Specialized Equipment. Where can I get more information on the Specialized Equipment? . . .

Yours truly,
ALLEN B. CHRISMAN
President
A. B. CHRISMAN GRAIN CO.

10 hours' work in an 8-hour shift!

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PRECISELY CONTROLLED HORSEPOWER!

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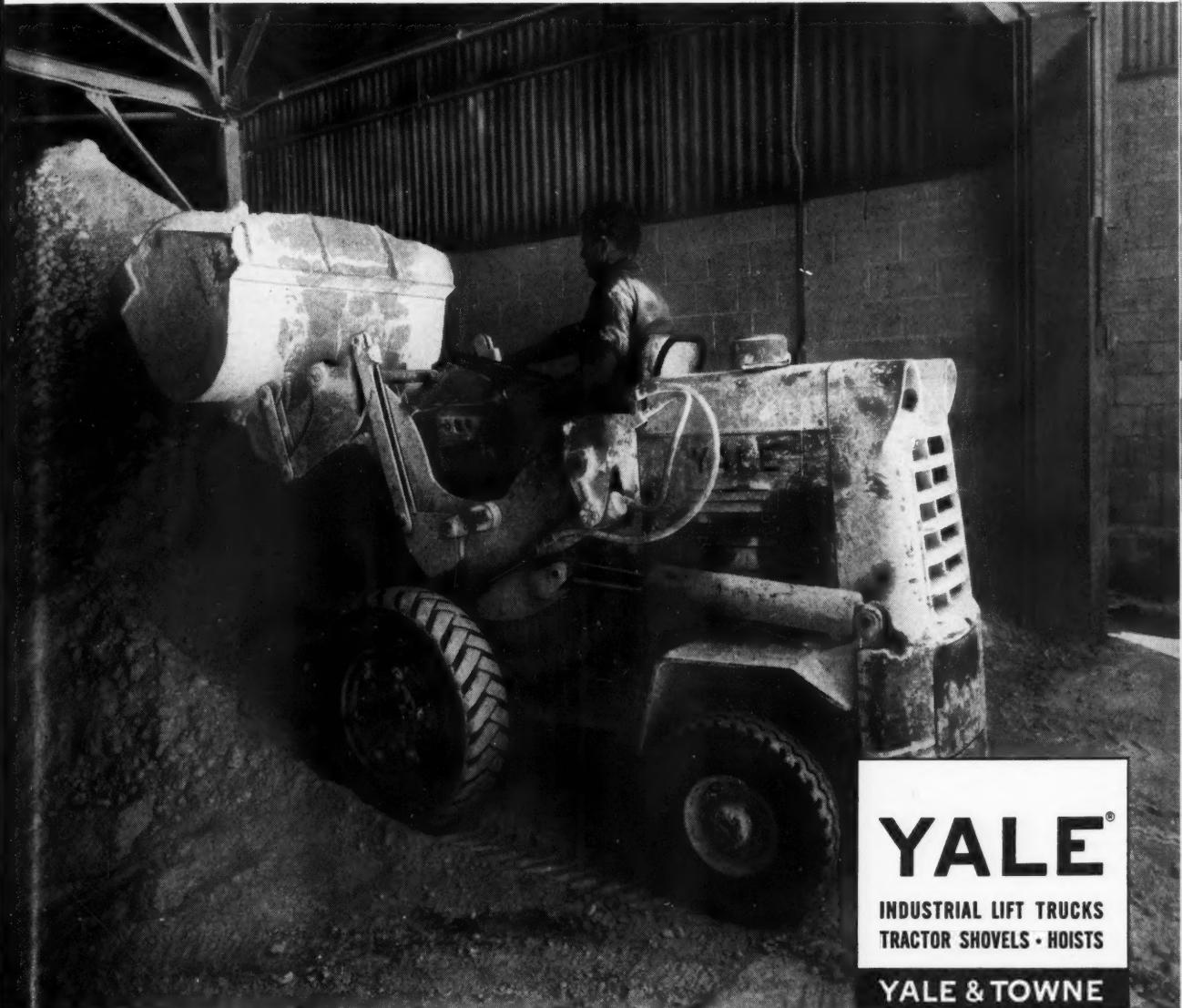
PERFORMANCE! 2500 lb. carry capacity. Exclusive 45° bucket tipback permits faster loading and lowest carry position for faster transport with minimum spillage. 6' dumping clearance permits dumping into bins and hoppers out of range of other—even larger—tractor

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WHAT'S DOING IN THE INDUSTRY

F
C

THOMPSON CHEMICALS BUYS ST. LOUIS PLANT SITE

As initial step in a major expansion program, Thompson Chemicals Corp. reports it has purchased a five acre plant site at Clarence Ave. and Third St., East, in St. Louis, Mo.

Ground will be broken in July for the first structure of a four-unit plant, and is scheduled for operation October 1.

HITCHNER ENDORSES HR6436 IN REMARKS BEFORE HOUSE AGRICULTURE COMMITTEE

"Today's agriculture is largely dependent on agricultural chemicals and agricultural chemical research," stated L. S. Hitchner, executive secretary of the National Agricultural Chemicals Association, before the House Committee on Agriculture, May 21.

This statement was part of Hitchner's remarks to the com-

mittee at a public hearing in conjunction with H.R. 6436, the proposed amendment to the Federal Insecticide, Fungicide and Rodenticide Act relating to the inclusion of desiccants, defoliants, plant regulators and nematocides in that act.

"As new products are developed it is desirable that they be regulated in a uniform manner with other agricultural chemicals," continued Hitchner, "and this bill provides for the inclusion of four categories which have grown in importance to agriculture and to the industry since the passage of the Federal Insecticide, Fungicide and Rodenticide Act in 1947."

"If these products had been in commercial usage in 1947," he declared, "they would undoubtedly have been included in the law at that time."

Hitchner stressed that the legislation would be of benefit to

growers by assuring careful review of labeling claims and directions for use by the U. S. Department of agriculture before the products are offered for sale in interstate commerce. Farmers, too, would be assured that their products would be safe and within the tolerance limits established by the Food and Drug Administration.

Enactment of this legislation "would set a pattern which would enable the states to adopt similar amendments to their pesticide laws," stated Hitchner. "Many states are awaiting the passage of this legislation so that it can be adopted as a part of a uniform state legislative program."

Hitchner concluded his statement with the request that careful consideration of the proposed legislation be made by the committee and expressed his hope that the proposed amendment would be passed at this session of Congress.

THIS MONTH'S

Meeting Highlights

TVA Pilot-Plant Demonstration of Fertilizer Technology

Fertilizer-Munitions Development Center, Muscle Shoals, Ala.
June 9. Following registration, there will be a general meeting and discussions of ammoniation, granulation and nitrogen loss. In the afternoon, production of 12-12-12 in the continuous ammoniator and apparatus for estimation of nitrous oxides in effluent gas will be demonstrated.

June 10. Production of high-nitrogen grades will be discussed; then a demonstration of the use of TVA-produced 30-10-0 in the production of 20-10-0 fertilizer. In the afternoon, production of granular nitrogen grades will be discussed, after which there will be a demonstration of the production of 0-25-25 using the phosphate rock-phosphoric acid reaction to promote granulation.

June 11. Liquid fertilizer conference. Talks and discussions will be held on status of technology and recent developments. The afternoon will be devoted to demonstrations: Production of 0-23-23 liquid fertilizer from caustic potash and superphosphoric acid, production of 8-24-0 liquid fertilizer from wet-process phosphoric acid by sequestering impurities with 11-33-0 made from superphosphoric acid, pumping and spraying of suspension fertilizers, and an exhibit of various grades of liquid and suspension fertilizers.

Seventh California Fertilizer Conference

Chemical Building Auditorium, University of California, Davis
June 29. Topics to be discussed include "Fertilizer Placement for Bed Grown Vegetables," "Some Aspects of Fruit Nutrition," "Status of Major Element Nutrition of Grapes in California," "California Fertilizer Statistics," and "Nutrient Deficiencies in Fruit Tree Crops." At the banquet, to be held at the El Rancho, Sacramento, Dr. Daniel G. Aldrich, Jr., Dean of Agriculture, University of California, Berkeley, will discuss, "California's Changing Agriculture Pattern."

June 30. Two panel discussions are scheduled: Tree Fruit and Vine Nutrition, with Millard E. McCollam, American Potash Institute, as moderator; and Fertilizer Placement, moderated by Dr. J. E. Knott, chairman, Dept. of Vegetable Crops, University of California, Davis.

HERBICIDE MARKETING RESEARCH REPORT READY

The marketing research division at Doane Agricultural Service, Inc., St. Louis, Mo. has just completed the first in a series of studies in herbicide marketing.

The report, available free of charge to manufacturers of herbicides, deals with such things as: 1) share of market by brand, 2) application on specific crops by type of herbicide, 3) consumer acceptance, 4) sales outlets and 5) extent of use vs. non use of chemical weed killers.

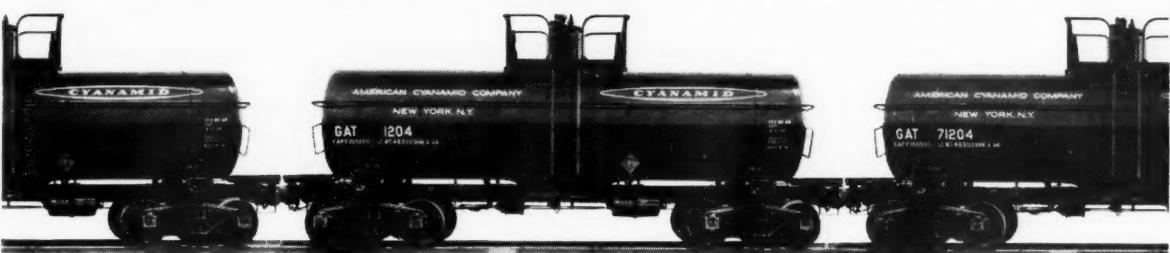
The survey will be repeated annually and will provide data to aid manufacturers to determine such things as 1) market potential, 2) trends in use and purchase, 3) sales appeal and 4) product acceptance.

In this first survey, it was found that 42.9 per cent of the farmers in the study used herbicides in 1958. Of the total acreage treated with chemical weed killers, 51.3 per cent was on corn.

EDITOR'S NOTE: A complete summary of this report will appear in this magazine next month.



How quality can make a problem



False modesty would get us nowhere. So let's say it: we make the fertilizer industry's highest quality phosphatic fertilizer solution... less than 1% solids... less than $\frac{1}{2}$ of 1% variation from 54% P₂O₅ content. Your overwhelming demand for our product has run us out of tank cars. We've ordered more. They'll be hitting the rails all summer. By September, we will have doubled the size of our fleet. Please be patient with us for a little while. As we said, quality *can* make a problem.

American Cyanamid Company, Phosphates and Nitrogen Dept., N. Y. 20, N. Y.



WASHINGTON VIEWPOINT

F
C

- *Price support-production control programs might be "wiped off the books"*
- *ACP gets strong support from Congress despite USDA requests for sharp cutback*

Federal price support-production control programs now appear to be in danger of being wiped off the books. While this is by no means certain, there's a noticeable increase in congressional antagonism toward big spending on farm programs in this session. Few observers here really believe it will be done this year or next, but the atmosphere appears so supercharged that it wouldn't take much to touch off an explosion that would blast the controversial programs out of existence.

Straws in the wind: Recent debate in both the Senate and House over the Agriculture Department budget and proposals for a new wheat program has sparked rising demands to bring "reason" into the support programs. The clear implication is that unless city congressmen can be sold on a lower-costing program, they will take matters into their own hands and end it all. In an unexpected move, the House Agriculture Committee has decided to hold hearings on a bill by Indiana Rep. Adair to repeal all price support laws. While the committee has no intention of reporting out the bill, it has already gotten strong backing from city elements—and could boomerang on the committee. The committee's only idea is to get USDA and other opponents to present programs on record, and go on from there to develop other legislation. Demands for an end to the program come from other sources. For example, Senator Capehart, of Indiana, threatens to sponsor a repealer to any farm bill which does not offer a "more workable program."

The possibility is not lost on farm state lawmakers who have launched a concerted drive to show non-farm people that the multi-billion dollar farm program benefits all consumers and businessmen as well as it does farmers. This is being done to counter much of the adverse publicity the farm programs have received in the past few months. Kicking off the campaign was the House Appropriations Committee which declared that of the \$4 billion appropriated for regular USDA activities, fully half is of more benefit to the nation as a whole than it is to farmers. Veteran Senator Aiken, ranking Republican on the Agriculture Committee, is so concerned about the possibility of the demise of price support and controls that he spoke at length on the Senate floor on the subject. He warned that the entire economy of the nation would be rocked by the move—since "40 per cent of our national economy is generated on the farm."

Effect on the farm chemicals industry of a demise of all support and control programs would be difficult to assess. Generally speaking, however, farm experts believe the withdrawal of control on such crops as

wheat, cotton, rice, tobacco and peanuts would result in an immediate increase in planted acreage. This undoubtedly would bring about a sharp drop in farm commodity prices, and a general demoralization of the farm economy during the first year or two of no programs. Some economists predict wide fluctuations in both commodity supplies and farm prices. This in turn very likely would mean wide fluctuations in farmers' buying habits relating to fertilizer and chemicals. The most that could be said, in view of lack of studies on the matter, is that farm chemical sales would lose their relative stability of the past few years, in favor of wide annual variations depending upon the fluctuating fortunes of farmers.

After several years of gyrating markets, however, fertilizer and chemical sales very likely would settle down once more to stability as the agricultural economy became adjusted to the new order. The adjustment period would be characterized by a more rapid development of big farms and fewer of them.

Soil Bank Conservation Reserve now is fighting for its life. During the past month, surprising opposition has developed to expansion of this land-retirement scheme. The Agriculture Department still favors it strongly, but because of the current economy drive the Budget Bureau has ordered a sharp cut-back on plans for large-scale expansion.

Strong opposition has come from the House, which has passed an appropriations measure prohibiting any expansion beyond the 23 million acres already signed up. USDA had asked for authority to pay for retirement of whole farms in an expansion drive, but the House went on record against it. Appropriations Committee put it this way: "The removing of any sizable number of farms in their entirety in any given community would do far more damage to the local community than any benefit which might come from such added reduction in farm output."

Congress is skeptical that a big expansion of the Reserve would have much effect on surplus production. The House Committee said: "It is hard to understand how anyone could believe that renting second-rate land could make any real dent in production. Actually, if the law authorized the rental of all the 275 million acres of the 2.6 million small farms, which represent 56 per cent of the total farms of the nation, to be put in the Soil Bank, this would retire only 9.1 per cent of total commercial production. And that would be contingent upon the larger producers not increasing their production."

The Agricultural Conservation Program (ACP) is getting the expected strong support from Congress,



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What's Coming Next Month

We're halfway through the year and the days are getting hotter as we approach our July issue. We're reminded somewhat of the story of the rebuilding of the wall of Jerusalem which is told in the Book of Nehemiah. "So built they the wall for the people had a mind to work." Now we don't claim to be motivated by the same spirit that made those people labor under the sweltering sun, but our new marketing approach does give us a mind to work! (With or without air conditioning.)

Well, we've worked into the subject of our first article in the July marketing section—how to get people to produce.

■ MOTIVATING YOUR SALESMEN

A host of articles have been published under that title. Many of them weren't worth the paper they were printed on. But it's time we covered the subject—and need we say more than the fact that it will be by-lined by Erwin H. Klaus, who wrote "How to Put Muscle in Your Marketing"? Hundreds of reprints of that valuable article have been sent out of this office. We expect his second article to be as well received.

■ MADE-TO-ORDER FERTILIZER

What'll you have? Magnesium? . . . boron? The customer is the boss with this fertilizer operation which supplies trace elements in the mixed dry goods—in whatever proportions a customer may desire. This article describes the operation in full.

■ NPK CONVENTION REPORT

A "blue list" of distinguished people head the 1959 National Plant Food Institute Convention program at the Greenbrier. For full details be sure to check the program on page 14 this issue. Always THE meeting of the year for fertilizer folks, there will be plenty to report on next issue.

... in the new

FARM CHEMICALS

WASHINGTON VIEWPOINT

in the face of USDA requests for a sharp cut-back. The House approved the usual \$250 million for payments in the program under which the government shares costs 50-50 with farmers on conservation practices, including lime and fertilizer applications. The Senate is expected to concur.

The USDA requested that the program for 1961 be cut down to a total of \$100 million, with the idea that much of the savings would be made from curtailment of payment for so-called temporary practices such as fertilizer. This is the fourth year USDA has unsuccessfully fought this battle. Significantly, hearings brought out the fact that USDA administrative costs in running a \$100-million program would amount to about \$25 million out of the total \$100 million.

Dessicants, defoliants, plant regulators and nematocides now are expected to be included under the existing pesticide control laws. Hearings before the House Agriculture Committee on May 21 wound up in total agreement that the amendment (HR 6436) be added to the 1947 Federal Insecticide, Fungicide, and Rodenticide Act.

Officials of NACA, Farm Bureau, apple growers associations, pesticide control officials, and others testified that the amendment would be a good thing for growers, manufacturers and consumers alike. Said Committee Chairman and sponsor Rep. Harold Cooley, "I'm thankful that Secretary Benson, the Farm Bureau, and I can all be in agreement on at least one thing."

L. S. Hitchner, NACA executive secretary, particularly urged passage of the bill during the current session of Congress. "Many states are awaiting the passage of this legislation so that it can be adopted as a part of a uniform state legislative program."

Boll weevil research program and laboratory once again has been urged upon the USDA by the House Appropriations Committee. The Committee last year asked USDA to come up with a firm plan for such a program, but so far this has not been forthcoming. While the Committee provided no funds to launch an all-out attack on this major pest, it now has ordered the Department to submit detailed plans with the promise that funds will be made available when the plans are firmed up.

Transfer of acre allotments between farmers by sale or lease may be permitted by Congress starting next year—unless the USDA can derail the idea. The Senate has passed a measure permitting such transfers among cotton growers, and the House is expected to pass a similar bill for other crops.

Opposition comes from the USDA, however, for the same reason the farm chemicals industry might favor such a deal: It would make more land available for the major crops of wheat, cotton, peanuts and to a limited extent, tobacco. USDA says this would increase surplus production by permitting larger farmers to plant acreage not used for support crops by smaller farmers.



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Fourth annual convention



R. E. Bennett, President

GUEST SPEAKERS



Rep. Jamie L. Whitten



Earl F. Crouse



R. J. Hildreth



L. D. Baver



R. A. King



J. Fielding Reed

MEMBERS OF THE National Plant Food Institute attending the fourth annual convention at The Greenbrier, White Sulphur Springs, W. Va., June 14-17, will hear nationally-known scientific authorities on the subject of "Fertilization in the Future," and members of the staff will present a comprehensive "progress report" covering Institute activities under an expanded program.

Rep. Jamie L. Whitten (D-Miss.), chairman of the House Subcommittee on Agricultural Appropriations, will be the featured speaker on Tuesday morning, June 16. His subject: "What's Needed in the Farm Program."

Registration will begin on Sunday, June 14 and the program, on Monday morning, June 15.

PANEL: "NPFI ON THE MOVE"

Richard E. Bennett of Omaha, Nebraska, president of the Institute, will be the first speaker Monday, when he gives a brief progress report on the organization's activities. His talk will be followed by a panel discussion of "NPFI on the Move" with Dr. Russell Coleman, executive vice president of the Institute, as the moderator.

Panel speakers will include: Dr. Richard B. Bahme, Western regional director, on "Spreading the Word About Fertilizer"; Zenas H. Beers, Midwest regional director, on "Raising Farmers' Sights"; Dr. Samuel L. Tisdale, Southeast regional director, on "The Intensified Approach to the Fertilizer Market," all representing the Institute. Dr. R. A. King, professor, Department of Agricultural Economics, North Carolina State University, Raleigh, and Dr. M. S. Williams, chief agricultural economist for the Institute, will discuss "Predicting Next Year's Fertilizer Sales" as part of the panel.

The annual business meeting of the Institute will follow.

FERTILIZATION IN THE FUTURE

Monday afternoon, June 15 program will be "Fertilization in the Future" with W. R. Allstetter, NPFI vice president, as moderator. Speakers will include: Dr. L. D. Baver, director, Experiment Station of the Hawaiian Sugar Planters' Association, Honolulu, on "Scientific Feeding of High Value Crops"; Dr. J. Fielding Reed, southern manager, American Potash Institute, Inc., Atlanta, on "Converting Low Value Crops into High Value Crops"; and Dr. R. J. Hildreth, research coordinator for West Texas, Texas Agricultural Experiment Station, Lubbock, on "Minimizing Weather Risks with Fertilizer."

Tuesday morning, June 16 program will begin with the showing of the Institute's new film, "Cash in on Grass" followed by addresses on "What's Happening Down on the Farm" by Earl F. Crouse, Farm Business Council, Urbana, Ill., and "What's Needed in the Farm Program" by Rep. Whitten.

The annual banquet will be held on Tuesday evening, at which winners in the "Soil Builders Award for Editors" contest will receive scrolls.

Officials of the Institute estimate attendance at the convention will approximate 1,000 persons, consisting of members, prominent agricultural leaders in business, government and communications. ▲

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14 ways to win definite decisions when the prospect says "I'll think it over."

EVERYTHING has gone smoothly. You've told your story, dramatized the benefits, asked for the order.

Then—the letdown: "I'll think it over."

You haven't been turned down flatly, but you haven't made the sale, either. Your prospect is simply postponing making a decision.

There is seldom a compelling reason for his needing that extra time. His postponement may mean that there is some area in which you haven't completely sold him. It may signify some hidden misgiving about your proposition. It can even be a smoke screen for some intensely personal reason for not buying.

Under those circumstances, can you still try for an on-the-spot decision?

"Heck, yes!" say the men who habitually do it.

And here, selected from sales experiences in a wide variety of fields, are 14 of the very best ways.

1. Ask "Why?" "I'll think it over," says A. J. Zemel, vice president, Premier Peat Moss Corp., "is sometimes just subterfuge on the part of the prospect, a veil he's using to cover up the real reservations in his mind. The salesman's job is to pierce that veil and get the objections out in the open, where he can deal with them.

"Whenever I'm tossed that one, I say, 'Let's think it over together. While I'm here, I can give you the benefit of my experience and answer any specific questions you may have.' Such an invitation, reflecting a genuine desire to help, not only disarms the prospect; it encourages him to bring his real doubts and objections forward. And I can usually answer them to his complete satisfaction."

A top salesman for a chemicals company finds that sometimes the "I'll-think-it-over" reaction indicates

that a potential customer doesn't know himself exactly what his true objections are. By asking "Why," the salesman helps the prospect resolve his own uncertainties, pins him down to specifics, overcomes them—and frequently buttons up the sale right then and there.

Another, the sales representative for a construction machinery manufacturer, is astonished by the variety of reasons smoked out by his innocent "Why?" "Once," he recalls, "it turned out that the purchasing agent I was dealing with was slated for promotion to Vice President. With this promotion imminent, he was frankly afraid of upsetting precedent—in this case, changing from the machine his company had always used. My reply uncapped his pen like a magnet. Tactfully, I suggested that by giving me the order, he would demonstrate the kind of decisiveness that would underscore his qualifications for promotion."

2. Cite a special inducement for making the decision now. "Order today and you can have delivery within 48 hours." "This week only we're offering a 3 per cent discount on all orders." "Prices are going up on the 15th." "This model is going fast. Demand is beginning to outstrip production." "Our national advertising campaign is breaking on the 10th—I can still get stock to you in time to meet the initial demand." Any "bonus" that you can truthfully offer a prospect for buying now can tip the scales in your favor.

3. Prove that the prospect can afford to buy. Suggests Frederick R. George, vice-president in charge of sales, American Agricultural Chemical Co., "The man who says, 'I'll think it over' may not be sure that he can afford your product. Dramatize the

"I'LL THINK IT OVER"

By TED POLLOCK

This is the second in a series on "Successful Salesmanship." The 14 ideas presented here were selected from the author's survey of experiences of top sales people in a variety of fields. Some of them may work for you.

savings, the small investment, the self-liquidating features of your plan and you may initiate action."

"By using our special heavy-duty bags," says one salesman, "you largely eliminate the expense—and time loss—of breakage."

4. "You're paying for it anyway." One company rests its case on the motto, "The man who doesn't own one is paying for it anyway."

How about you?

Can you cite some impressive figures on what your prospect's present inefficiency, labor expenses, lack of stock, discomfort is costing him—a cost that an immediate order will lower or eliminate?

"Think it over by all means," answers James Mundie, district sales manager, Multiwall Bag Division, West Virginia Pulp and Paper Co., "but I'd like to point out that every 'thinking day' is costing you X dollars in avoidable packaging bills."

5. Assure him that he won't be making a mistake. When a man wants time for thought, it may be because he is concerned over what the brass will say about his purchase. Or his partner. Or his colleague.

C. P. Schaffer, manager, Nitrogen Products, American Cyanamid, advises: "Do a little judicious name dropping. Show the prospect testimonials and give him other proofs of purchases by people whose judgment he respects. Be prepared with slides and pictures of the results achieved by others who have used your product. If possible, take him for a visit to a satisfied customer. If you can show him a hundred, thousand or ten-thousand dollar order from a leading firm or citizen, he's bound to feel more secure about his buying judgment. Everybody likes to back a winner. Prove that your product is in demand by the pace-setters in your field or community and

you'll spur positive action from the man who keeps looking over his shoulder."

Suggests another large-company executive: "A smart salesman finds out whom the buyer must answer to for his purchase, then volunteers to help sell *him* on the decision to buy. He suggests, 'Why don't we visit the president (or your partner, or your colleague) together? That way, maybe we can clear up any special questions he may have.' In other words, the salesman offers to help the buyer 'spread the responsibility' for his decision to order."

6. Congratulate him on his caution. "This certainly represents an important investment for you and I can understand your wanting to make the wisest possible decision. The wrong product (service, line) could easily cost you \$500. The right one could just as easily save (make) you \$1000. And this is the right one because . . ."

By apparently agreeing with your prospect's position, you subtly ally yourself with him, at the same time creating an opportunity to re-emphasize the benefits of your product.

7. Help the prospect shrug off his "guilt complex." Urge him, "Be good to yourself—you deserve the benefits of my product or service." Most of us fancy ourselves martyrs who must do everything for their families and very little for themselves. Given the least self-justification for buying, a prospect may give you the green light.

For example, a potential customer may have been born on "the wrong side of the tracks." Even though he is now enjoying a higher standard of living, he may suffer from a gnawing suspicion that it's somehow "wrong" to spend so much money on a beautiful lawn or labor saving tools. Your assurances that he

"deserves" the benefits of your product may strengthen his sense of justification.

8. Ignore It. Sometimes, "I'll think it over" is merely a verbal shrug of the shoulders, not to be taken seriously. In such a case: keep talking. Your very next sentence may close the sale.

9. Create a sense of obligation. With the man who wants to "think it over," the pros and cons of your proposition may be weighing about evenly. Your job: to build up the positives so that they outweigh the negatives. One way to do this is to get your prospect into "psychic debt" to you, either by doing something for him or by getting something that has some value into his hands.

Some favorite approaches: "Then I'll reserve two gross for you—to make sure it will be available when you give us the order." "Let me write up the order and leave it for your signature. You can mail it in when you decide." "I'll ship those samples to you right away." "Why not insure it with a small deposit?"

W. J. Bucklee, general sales manager, Celite Division, Johns Manville Corp., likes to make a new appointment on the spot, sometimes brings another man along to the interview. "The fact that I've taken the trouble to arrange for a visit by one of our specialists," Mr. Bucklee explains, "frequently gives me just the psychological edge I need to get a favorable reply."

10. Find out if you're talking to the right man. Are you sure he has the authority to buy? Many times, the man who seems to be the right one is merely a "screener" or "buffer" who may hate to confess the limitations on his authority, hence says, "I'll think about it."

There are several ways to find out who signs the orders at a company. Your own sales manager may know. Other, non-competitive salesmen who serve the firm can tip you off. If you are delicately discreet in your inquiry, the company's receptionist can be a well of information. Various credit rating reports are yours to draw on.

When you do locate the right man, however, be sure to contrive some way of seeing him without alienating the "buffer."

11. Use the "Rivalry Stimulus." Every businessman has a built-in sense of competition. Use it to trigger an immediate decision: "Then I'll hold off making it available to anyone else in this area." "I'll try to postpone that appointment with the

A FIFTEENTH WAY

Sometimes, Uncle Sam can help you convince the undecided prospect.

Depending on what it is you're selling (and be sure to check with your company first), it is frequently possible to prove that an immediate order can save the prospect a pile of cash by enabling him to write off part of the purchase price as depreciation. The later in the year he buys, however, the smaller the percentage he can deduct for that year.

It's logical, legitimate and legal.

Acme Company." "We've received four inquiries from this neighborhood. Suppose I stall them off for 48 hours?" "You might be interested to know that Jones down the road has already ordered."

12. Is there anything special we can do for you?" Lurking behind the "I'll-think-it-over" stall could be the desire for a concession of some sort. Find out what it is—maybe you can oblige.

For example, a salesman for a materials handling equipment company was having a tough time getting his product adopted by a certain chemicals firm. When the owner finally said, "I'd like to think about it," the salesman countered with, "What exactly can we do for you?" It turned out that a competitor had guaranteed the chemicals firm that his company would make maintenance checks on the machine at three-month intervals for a year at no additional charge. When the salesman said that he could match the offer and volunteered to put it in writing, he got the order.

13. Offer guarantees. Every company that offers a money-back guarantee on its product does so confident in the knowledge that only an infinitesimal fraction of the public will ever take advantage of it.

The principle is a sound one. People hate to part with things once they have them. Put that human quirk to work for you. If your product or service lends itself to such an agreement, offer a free trial period during which the prospect can actually experience the benefits you have been talking about. Come decision-making time, almost certainly he will buy.

"Use it for a week, at no obligation," offers a salesman for an air purifier concern. "If you aren't more than satisfied, we'll take it back, no questions asked." He seldom has to pick up a purifier.

"Wouldn't it save us all a lot of time if you were to okay the deal now," asks another, "with the understanding that you can cancel within one week if you should decide otherwise?" In a surprising number of cases, that clinches the sale and only rarely does the prospect ever cancel.

That's human nature. And every prospect's human.

14. Sell the satisfaction of making a decision. Most people are procrastinators. They hate to make decisions. But help them make one and you accomplish two things: you make them pleased with themselves for getting something constructive done and pleased with you for not having wasted their time.

"Wouldn't today be a good time to get this settled and off your mind?" sounds simple, but it can be most effective.

A salesman for a highly specialized machine service finds this approach works: "I wonder, Mr. Prospect, if you haven't had the same experience as I—that more is frequently lost through indecision than through a wrong decision?" Then he goes on to prove that it is better to go through with something that meets 75 per cent of your requirements and will get results than to hold out for 100 per cent, meanwhile getting no results at all.

"In a sense," answers another man, "indecision is a decision—a decision to postpone solving a problem. Now, while everything is fresh in your mind, why not weigh the pros and cons and come to a profitable decision?" ▲



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The PESTICIDE SITUATION For 1958-59

EARLY SEASON DEMAND for pesticides was reported in larger volume this year than in 1958. Total supply is expected to be ample.

"Production of pesticides in 1958 was well above the 1957 level, on the basis of the limited data available," reported Harold H. Shepard, of the Commodity Stabilization Service, U. S. Department of Agriculture.

Increased production of DDT, the aldrin-toxaphene group, and many materials recently in commercial manufacture more than offset the reduced output of benzene hexachloride, copper sulfate, 2,4-D and 2,4,5-T.

"Domestic disappearance of chlorinated hydrocarbon insecticides rose to a new high in 1958," Shepard said. "Disappearance of DDT and of benzene hexachloride was somewhat lower than in 1957, and calcium arsenate and rotenone fell markedly."

Organic phosphorus insecticides also continue to increase in volume of sales and in diversity of kind and use.

Stocks of pesticides on hand at the end of the 1958 growing season

(Continued on page 32)

Value of Shipments of Pesticides by U. S. Manufacturers, 1954-1957

Class of products	1954 \$1,000	1955 \$1,000	1956 \$1,000	1957 \$1,000
Agricultural insecticides and fungicides	177,956	195,103	193,608	195,323
Household insecticides and repellents	60,635	67,876	79,716	80,144
Weed killers	36,344	40,807	n.a.	n.a.
Totals	274,935	303,786		

Sources: 1954 Census of Manufactures; Annual Surveys of Manufactures, Releases Series MAS-35-2, MAS-56-2, and MAS-57-2.

U. S. Production of Some Major Pesticidal Chemicals Calendar Years, 1956-1958

Chemical	1956 1,000 lb.	1957 1,000 lb.	1958 ¹ 1,000 lb.
Aldrin, chlordane, dieldrin, endrin, heptachlor, and toxaphene (combined production)	86,659	75,424	98,280
Benzene hexachloride (gross) ²	84,599	39,559 ³	31,000
Benzene hexachloride (gamma equivalent) ²	14,700	7,300 ⁴	6,200
Calcium arsenate	27,106	19,478 ⁴	9,000
Copper naphthenate	2,012	2,130	5
Copper sulfate	133,616	141,360	97,192
2,4-D acid	28,835	34,251 ⁴	28,500
2,4-D acid esters	19,476	24,137 ⁴	22,827
2,4-D acid salts ⁵	1,766	3,182 ⁴	
DDT	137,659	124,545	143,216
Disodium methylarsonate	6	618 ⁴	5
Lead arsenate	11,756	11,920 ⁴	5
Methyl bromide	10,204	9,653	5
Methyl parathion	6	1,925	5
Nabam	5,486	4,961	5
Parathion ("ethyl parathion")	6,529	5,962	5
Pentachlorophenol	31,385	28,346	5
Phenyl mercuric acetate	693	570	5
Sodium chloride	110,136	118,284	134,498
2,4,5-T acid	5,169	5,334 ⁴	3,500
2,4,5-T acid esters	7,045	6,831	5
Ziram	1,436	1,277	5

¹Preliminary. ²1958 includes lindane; 1956 and 1957 without lindane. ³Sodium and amine salts. ⁴Revised figure. ⁵Figure not yet available. ⁶Figure not publishable because it would disclose individual operations.

Sources: U. S. Tariff Commission; U. S. Bureau of the Census; U. S. Bureau of Mines; chemical industry.

Disappearance By Crop Years and Minimum Requirements for 1958-59¹

Pesticide	Domestic disappearance		Minimum requirements for domestic consumption in 1958-59
	1956-57 1,000 lb.	1957-58 1,000 lb.	
Aldrin, chlordane, dieldrin, endrin, heptachlor and toxaphene (combined) ²	52,500	78,834	60,000
Benzene hexachloride ³	6,600	5,500	6,000
Calcium arsenate	18,250	9,000	7,000
Copper sulfate ⁴	78,600	75,058	30,000
2,4-D (acid equivalent)	20,500 ⁷	21,300	22,000
DDT	71,000	66,700	65,000
Lead arsenate	12,000	n.a.	10,000
Pyrethrum ⁵	7,396	8,648	7,500
Rotenone ⁶	6,924	4,140	5,000
2,4,5-T (acid equivalent)	1,800 ⁷	3,800	3,000

¹Based on available information; crop year is from October 1 to the following September 30. ²Not corrected for exports below basic producers' level. ³Gamma isomer basis; includes lindane. ⁴Disappearance at primary producers' level for all domestic uses including industrial. Requirements are for agriculture only but include plant nutrient as well as fungicide use. ⁵Revised imports; includes flower equivalent of imported pyrethrum extract. ⁶Imports; include cubes and derris, both whole root and powdered. ⁷Revised by deducting estimates of exports from previously published figures.

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MARKETING



By HOMER HATHAWAY

WE'RE SELLING ALL the time."

That is the marketing philosophy of Tony Romano, owner of Quincy Farm Chemicals, Inc., Quincy, Washington. Located in the heart of the Columbia River Basin Development Project, his firm faces about as many diverse problems as any farm chemicals business any place. The successful solving of these problems has contributed to an almost giant growth of Romano's firm.

The Quincy plant was established in 1953, as a partnership, with Romano taking full charge in 1956 as sole owner. At first the plant handled only liquid fertilizer, of the non-volatile type. This past year Romano has added a dry fertilizer mixing operation to give his customers a complete choice of products.

"But what's all this about selling ALL the time?" I asked.

"Just what it says. The boys and I are even selling fertilizers when we are out on a coffee break. No matter what direction the conversation takes, we get in a plug for our business."

The results are self-evident. "Our business" has grown over 700% since it was established, and



Left: The recently purchased dry mix plant, showing outside bagging apparatus. Trucks can back up and be loaded directly from bagging platform.

Above is the field set-up. The large tank at right is set down into a hole dug in the field. Spreading rig, pulled by light tractor, is at left.

That's what Tony Romano, owner of the Quincy Farm Chemicals says. Geared to give fast, efficient service, the business has grown 700% since 1953.

Romano looks for another big percentage boost this year.

How was it done? Well, there were plenty of problems, but the biggest answer to all of it simply boils down to two words that cover a lot of territory—"Hard work."

"We certainly didn't sit back and wait for business to come to us. We knew we had one real advantage over the big operators—we were more qualified as individuals to handle *personal* problems for farmers than were the big operators who could not compete with us, or would not, in knowledge of product and personnel. We took nothing for granted. Every individual in the organization 'doubles in brass.' He can not only tell a farmer how to get the most out of his land, but can help him do it because he can back up his statements with working knowledge."

CUSTOM MIXING FOR EACH CROP

This "working knowledge" is best demonstrated by the fact that an individual farmer may face several different kinds of fertilizer needs on his 160 or more acres, with soils varying in degree of need. Romano and his crew move in and help to formulate custom-mixes for each particular type of crop being grown by that farmer. In the Quincy area that may mean sugar beets, potatoes, beans, peas, corn—almost any type of vegetable crop. And up and coming are the fruit crops—apples, cherries, apricots, pears, berries, grapes.

Each of these crops presents a different need as far as soil treatment is concerned. The bulk of the fertilizer operation is done in the pre-plant stage, so it can be thoroughly worked into the soil, with additional fertilizing being done at the time of planting,



Romano sets up jobs, checks on fields and directs operations through this mobile radio set-up from his Quincy office.

especially with potatoes. A dry mix is usually used for the latter crop.

How about the predominance of liquid fertilizer in the valley?

"I would say the predominance is 3 to 1 in favor of the liquid fertilizers, but this, too, was a matter of education," Romano said. "Few of these farmers could be called natives to this part of the country. They came here from other parts of the nation, and many of them had never used liquid fertilizer. But here, where irrigation is what keeps this valley fertile, they have learned that they get much better results with most crops if they used a liquid fertilizer instead of a dry one."

The physical set-up to handle the needs of their customers is interesting, and, according to Romano, to the best of his knowledge, is the only one of its kind in the country. It certainly saves tying up funds in delivery trucks and other large pieces of equipment.

They have mobile storage units which have been especially adapted to the irrigated set-up. These large storage tanks are on wheels. When they are brought out to a farmer's field, a large hole is dug and the tank is backed into it, so that the tank rests flush with the ground. Then the tank-truck from Romano's supplier drives in, fills the tank, leaving the farmer supplied for several days. Romano has about 13 field-applicator units which he rents to farmers, and these can be backed up to the storage tank, filled, and then the farmer does his own application. Less expense all around—Romano does not have to have men engaged in application, and the farmer saves money by "doing it himself."

GEARED FOR SERVICE

"The important thing is that when the rush starts, we have to be ready to meet it—we are geared to give service fast and efficiently. When our customer calls and says he wants service, we can't stall and say that an applicator will be available in a few days, or even hours. When he wants service, he wants it NOW, and we have to be geared to give it to him."

The mobile tanks have been a great help in this

regard, making it possible for the farmer to do his own applying, and Quincy Farm Chemicals has avoided tying up operating capital in large operating units that would remain idle much of the year.

Romano figures that he now has a capital investment in the business of around \$40,000 and each year continues to see this figure grow. That might possibly sound like a small operation, but it covers an immense territory. Quincy Farm Chemicals' marketing area covers 20 miles south and east of Quincy and about 8 miles west, with a marketing potential of 120,000 acres.

How do they do it? The field applicators rented to the farmers can cover about 10 acres an hour, after Romano and his crew have set up the rig for the farmer and shown him how to operate it. This of course, only has to be done once. Zene Flinn, farm consultant, is always available to give the farmer whatever additional help he may need, whether it be soil analysis or custom-formulating information.

THE DRY-MIX OPERATION

As to the dry-fertilizer operation: It is set up so that one man can mix and load out 20 tons an hour. As shown in the photograph, the bagging operation has been located on an outside platform so that the man can bag the fertilizer and load it right onto the farmer's truck or the company truck for delivery.

QFC has worked out another deal which contributes immensely to their efficiency. The Mid-State Aviation Service of Ellensburg does all its aerial application of pesticides. Romano sets up the jobs, checks on the fields and then directs the operation through a mobile radio set-up from his Quincy office.

All of the company pick-up trucks are also set up to operate from this mobile radio unit, and the drivers can thus be contacted to transfer spreading rigs from one job to another with the least amount of travel time necessary. This radio set-up contributes greatly to their ability to keep their spreading rigs in continual operation during the peak of the season.

What about credit in an operation of this kind?

"All of our accounts are net 30 days, with a discount for accounts paid within ten days after billing. We are in an entirely different position than the co-ops on this. We get to know our accounts thoroughly, even if they have to borrow from the banks to pay us. If a farmer belongs to a co-op he knows that the co-op will eventually buy his crop and deduct what he owes from his check. He knows that we do not buy any crops, and that the discount he gets by paying promptly will more than offset any price advantage offered by other firms. We keep our identity by being strictly a farm chemical servicing operation, not a crop buyer."

With a minimum crew, who keep busy in the fall doing some stubble (corn) fertilizing and sterilizing ditch banks, Tony Romano has proven that any sized operator can obtain a maximum of business, mainly through personal service, being geared to handle the "rush" when it comes, and also by "selling ALL the time." ▲

How do your dealers' attitudes and knowledge rate?

Iowa research men found that such common denominators as "progressivism" (attitude toward new merchandising techniques), "traditionalism" (perceptions of farmer traditions) and others (see table on page 26) are common denominators which determine success of fertilizer dealers.

WHAT KIND OF DEALERS do you have? Are they progressive—or do they make excuses? What kind of attitudes do they have? Do they blame their lack of success on competition, the type of farmers in their area, or other factors? Do they really make an attempt to understand what they are selling?

A preliminary report by Joe M. Bohlen, John Harp, and George M. Beal, department of economics and rural sociology, Iowa State College, Ames, has brought to light some interesting facts about the Iowa fertilizer dealer.

There are many common denominators which determine the success of fertilizer dealers—whether they come from Iowa or any other part of the country. It is with this conviction that FARM CHEMICALS presents the data gathered from personal interviews of a statewide *stratified* random sample consisting of 118 dealers, or 7 per cent of the fertilizer dealers in Iowa.

Creation of a successful dealer, the study indicates, calls for a proper attitude to begin with. Also, he should know fertilizer inside and out—and what it can do for the farmer.

Let's take a look at the specific factors which make him successful.

1) He offers fertilizer consultation service and bulk service. Major reason for their success, according to dealers themselves, was *service*. Thiry-nine per cent of the sample listed this as the major reason for success. Most important service as ranked by dealers were "helping farmers plan fertilizer programs" and "bulk application." Rating No. 3 was "credit."

2) He sells both dry sacked and bulk fertilizer. Most popular category of fertilizer sold was

"dry sacked and bulk," which accounted for 41.5 per cent of the sample. Sixty-six dealers reported selling some bulk, or 55 per cent of the sample. This figure differs from that shown under a previous question in the study, where 59 dealers reported using bulk spreading as a service. The suggestion was made by the authors that "dealers who reported bulk spreading as a service responded on the basis of greater use of bulk, than was the case with those reporting the sale of some bulk."

3) He adopts new merchandising techniques.

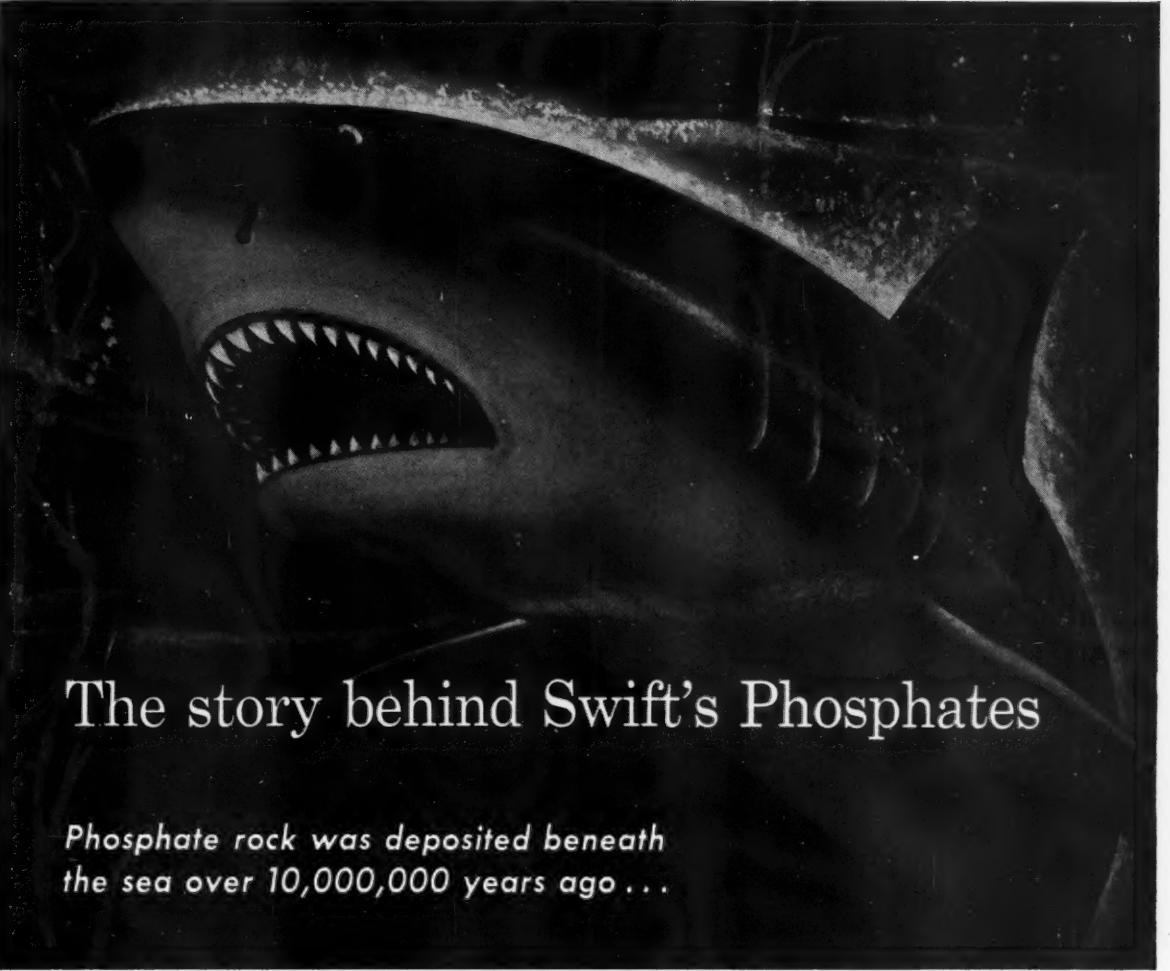
Attitude toward the adoption of new merchandising techniques showed that bulk dealers were more concerned with influencing farmers as to how much fertilizer to apply, what analysis to use, and how to apply. Among the non-bulk dealers 42 per cent were of the opinion that fertilizer dealers should not influence the farmer as to how much fertilizer to apply.

4) He participates in community groups. A majority of the sampled dealers perceived their community role as increasing their business "somewhat."

5) He offers credit as a customer service. A majority of the dealers offered credit and 63 per cent of them perceived a decrease in sales resulting from its discontinuance.

6) He rates the salesman highest as a source of information "most useful." Dealers commented on the need for more farmer education regarding fertilizer and its use, but questioned the allocation of their time to this task. They expressed need for more sales aids, to be supplied by jobbers and wholesalers to their salesmen.

(Please turn to page 26)



The story behind Swift's Phosphates

Phosphate rock was deposited beneath the sea over 10,000,000 years ago . . .

Today, Swift technology transforms it into forms you can use most profitably

Fossilized remains of giant prehistoric sharks in Swift's Florida phosphate rock deposits tell us these beds were formed at the bottom of a sea 10 to 15 million years ago.

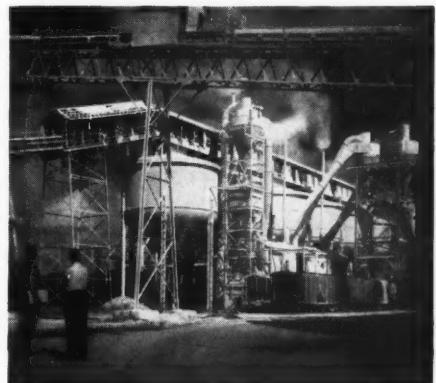
But all Florida pebble phosphate rock had the same beginning. The difference comes much later. It comes in the extra care Swift takes in processing to assure uniformity of grade and grind. It comes in Swift's careful attention to your delivery requirements.

Before you settle on your source of phosphate rock, ground phosphate rock or triple superphosphate, ask to have a Swift Phosphate Center representative outline what extra care can mean to you. Or write for illustrated brochure to SWIFT & COMPANY, Phosphate Center, Bartow, Florida.

THE SERVICE SOURCE FOR ALL YOUR PHOSPHATE NEEDS



To Serve Your Industry Better
WITH PHOSPHATE ROCK,
GROUND PHOSPHATE ROCK
AND PC-47 TRIPLE SUPERPHOSPHATE



How do your dealers' attitudes and knowledge rate?

(Continued from page 24)

SERVICES RANKED AS TO DEGREE OF IMPORTANCE BY DEALERS

Services	Points
Help farmers plan fertilizer programs	87
Bulk applicator	86
Credit	80
Calling on farmers	73
Send in soil samples	42
Volume discounts	41
Take soil samples	39
Seasonal discounts	37
Interpret soil test results	25
Newspaper and radio advertising	16
Cash discount	16
Discount for farmer hauling own fertilizer	15
Small dry fertilizer spreader	12
Anhydrous applicator	11
Soil testing (own lab)	9
Spring or winter fertilizer clinic	9
Fall fertilizer plot examination with specialist	6
Spread liquid fertilizer	5
Throw aways and mailings	4
Crop refunds	3
Multi-spread	3

REASONS GIVEN BY DEALERS FOR THEIR SUCCESS IN THE FERTILIZER BUSINESS

Reasons	Number	Per cent
Services	37	31.4
Sales techniques	20	16.9
Product handled	9	7.6
Coop dividend	7	5.9
Customer loyalty	11	9.3
Soil sampling	7	5.9
Credit	3	2.5
Other	11	9.3
Not successful	9	7.6
Don't know	4	3.4
Total	118	100.0

7) **He regards himself as a "seller of needed goods and services."** A significantly greater number of bulk dealers than non-bulk dealers, endorsed the "fertilizer consultant or technical consultant role."

8) **He offers a soil testing service.** Reports of interviewers showed that while dealers regarded taking and sending in soil samples as the No. 1 service *they should offer*, the allocation of time and effort to this activity was sometimes questioned on the basis of the adequacy of return. It was rated considerably below the services described as "help farmers plan fertilizer programs," "bulk applicator," "credit," and "calling on farmers," when dealers were asked to rank services as to degree of importance.

9) **He rates fertilizer use as "very important" or an "absolute necessity."** Seventy two per cent of the sample rated fertilizer as such in evaluating its importance to farmers' crop income.

10) **He views price-cutting as the major unfair competitive practice.** When dealers were questioned as to sales techniques being used against them, price cutting also received a majority of responses (60 per cent).

11) **He rates the fertilizer company publication as information source "most frequently used,"** followed by "farm magazines" and "salesmen."

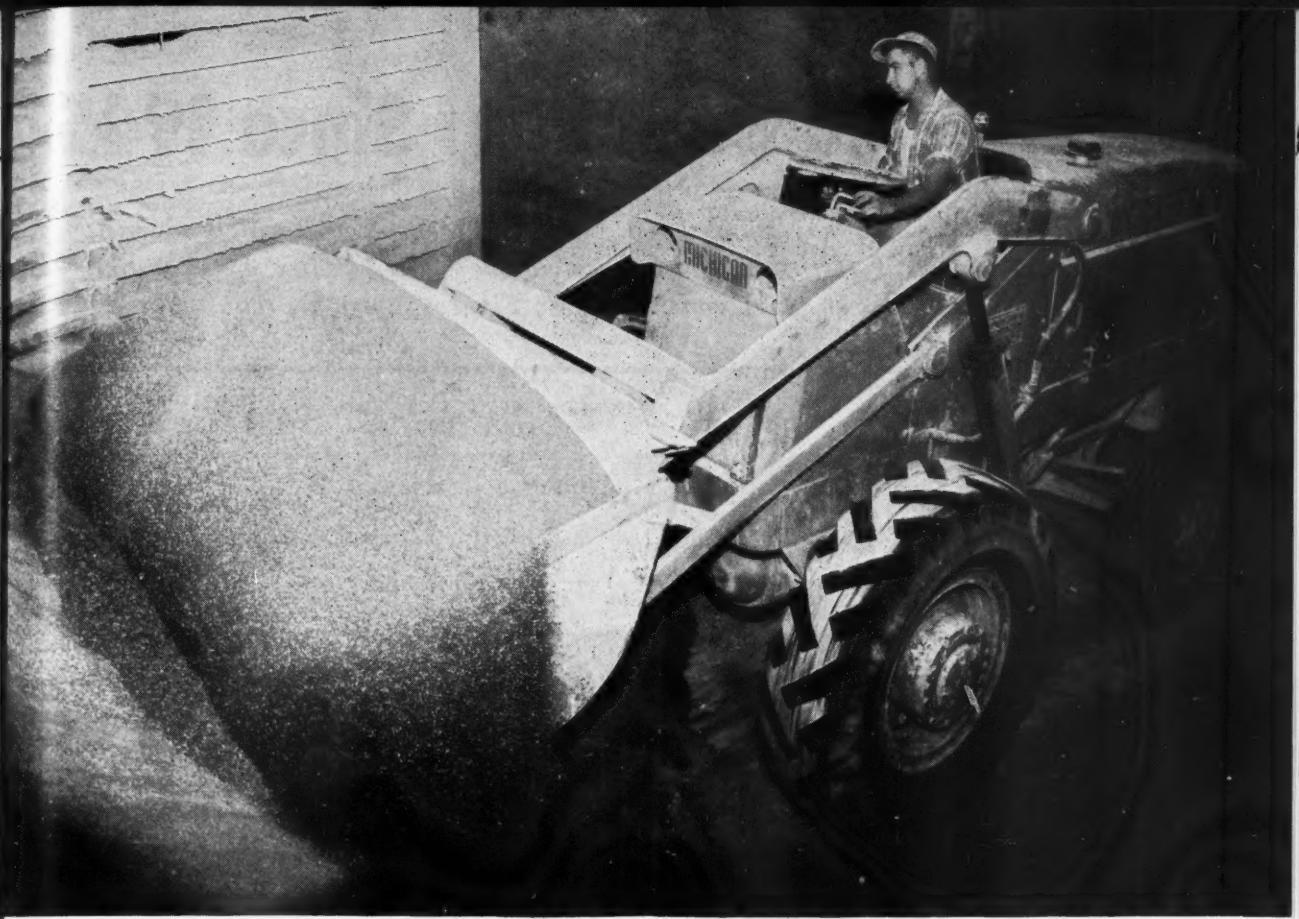
12) **He operates a farm supply company.** The study treated the farm supply companies as a separate group since they were unique with respect to a number of social and economic variables. Example: All 15 of the farm supply companies, affiliated with the Farm Bureau, had adopted bulk spreading as a service. Significant differences were also found between the farm supply companies and other types of retail establishments when compared on the basis of a) progressivism, b) fertilizer knowledge, c) number of services offered d) contribution of fertilizer sales to total sales. The direction of these differences favored the farm supply house. (See table.)

MEAN SCORES COMPARED ON THE BASIS OF TYPE OF BUSINESS

Variables

Type of business	Scientific agriculture	Progressivism	Traditionalism	Fertilizer knowledge	Formal education	Number of services	Per cent fertilizer sales of total	Offer soil test	Offer bulk	Yes	No	Yes	No	N
Farm Bureau.....	39.80	38.20	24.87	5.6	13.73	12.00	31.13	8	7	15	0	15		
Cooperative.....	39.09	35.48	24.67	4.6	12.09	8.90	5.00	12	9	10	11	21		
Farmer.....	39.18	34.91	26.45	4.7	12.00	8.82	23.91	8	3	4	7	11		
Corporation.....	37.31	35.46	26.31	4.7	13.31	7.69	8.85	6	7	7	6	13		
Private.....	37.05	34.22	26.38	4.4	12.10	7.02	13.03	23	35	23	35	58		

118



Dust a problem in your material handling?

Here's how Michigan Tractor Shovels help Swift & Company

Swift & Company's plant food division at Madison, Wisconsin has the usual problem encountered in the processing of raw materials such as potash and superphosphate, and in handling the finished plant foods.

Equipment used in these processes is exposed to long hours of continuous maneuvering while handling the bulk materials. Equipment must be durable

to withstand the heavy loads, quick stops, and grit of raw material acting on the machine. Swift officials report the one-yard 77 hp Michigan Model 75B shown has given excellent results in meeting these requirements.

Works round-the-clock

"It is dependable," says Madison Assistant Superintendent Harry Peeler. "It worked round-the-clock during our latest two-month rush season. Its only stops were to add fuel, inspect oil, and change operators. We've had no troubles with grit in the power-train . . . and no axle failures."

Ken Kremelling, veteran tractor shovel operator, says, "Michigan's torque converter helps you heap big loads fast. Low bucket-carry helps you keep what you load. Power steer takes



Moving potash 110 ft from bin to mixer, Michigan is timed delivering 60 loads (97,200 lbs) per hour. Unit changes direction and speed at flick of power-shift lever. No clutching needed.

you around turns fast. And power shift helps you start back for the next load fast."

See Michigan advantages for yourself

A trial in your plant will show you how these same advantages can pay off for you. Write for details on the size Michigan that interests you—6, 10, 15, 20, or 27 cubic feet; 1, 1½, 1¾, 2, 2½, 4 or 6 cubic yards.

Michigan is a registered trade-mark of
CLARK EQUIPMENT COMPANY

Construction Machinery Division
2461 Pipestone Road
Benton Harbor 22, Michigan

In Canada: Canadian Clark, Ltd.,
St. Thomas, Ontario

CLARK®
EQUIPMENT

Fertilizer Consumption Since 1945

Moyle S. Williams, National Plant Food Institute chief agricultural economist, prepared this report of fertilizer consumption in the United States, by state and region, for the past fourteen years, ended June 30. Figures shown are thousand tons.

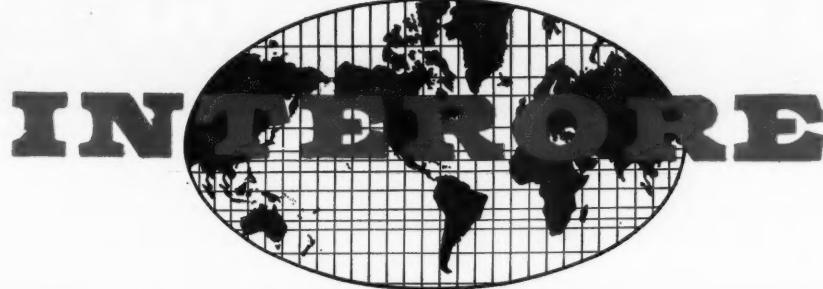
State & Region	1944-45	1945-46	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1957-58 (Prel.)
Maine	235	254	253	257	230	225	165	213	211	172	182	183	172	182
New Hampshire	29	28	23	33	26	28	26	21	21	16	18	16	19	20
Vermont	38	47	46	57	65	63	63	56	50	38	48	51	55	59
Massachusetts	89	89	84	86	92	89	96	92	85	85	85	74	87	87
Rhode Island	18	18	17	19	19	18	18	17	16	15	17	15	17	18
Connecticut	86	85	83	83	89	94	89	87	88	90	88	77	84	89
New England	493	521	506	535	521	517	457	486	471	417	440	416	435	455
Mid-Atlantic	622	1,681	1,777	1,797	1,856	1,894	1,956	2,044	2,119	2,069	2,129	1,943	1,946	1,927
South	599	653	676	698	709	728	831	869	853	799	817	778	772	708
Virginia	249	247	245	254	276	238	258	265	277	291	286	262	269	246
New Jersey	498	516	551	565	586	632	625	665	697	681	715	653	634	640
Pennsylvania	49	52	55	54	57	58	67	80	91	95	96	85	88	78
Delaware	1	1	2	2	2	2	2	3	3	3	3	3	3	4
Dist. of Columbia	225	229	255	244	246	252	276	297	304	313	318	281	292	283
Maryland	67	90	95	100	102	104	101	100	87	77	82	85	82	73
West Virginia	653	5,014	5,474	5,245	5,536	5,409	6,004	6,180	6,271	6,143	6,081	5,953	5,928	5,614
Midwest	640	692	780	853	931	907	952	1,050	1,174	1,094	1,085	1,050	1,036	1,053
Ohio	500	605	663	803	827	798	935	1,083	1,206	1,181	1,153	1,064	1,087	1,081
Indiana	487	554	967	1,007	973	871	1,177	1,434	1,653	1,506	1,211	1,360	1,369	1,422
Illinois	311	374	399	411	466	474	506	591	648	600	639	628	637	615
Michigan	238	290	349	425	398	384	410	394	419	441	430	412	426	436
Midwest	176	2,516	3,159	3,500	3,595	3,434	3,979	4,552	5,101	4,823	4,517	4,515	4,555	4,607
West	95	167	153	226	252	218	201	225	268	323	373	368	426	445
Minnesota	143	196	229	309	368	333	386	427	550	652	585	449	468	534
Iowa	167	215	278	325	389	408	637	753	834	757	683	810	802	756
Missouri	7	8	18	34	22	19	14	31	40	48	63	69	82	106
North Dakota	1	2	5	11	10	5	9	11	17	30	38	27	25	34
South Dakota	3	8	12	25	38	44	68	94	146	199	208	133	170	232
Nebraska	47	40	74	98	113	160	186	208	240	216	235	208	212	191
West	462	636	770	1,028	1,191	1,186	1,501	1,750	2,095	2,224	2,184	2,064	2,185	2,298
South Central	317	372	386	476	551	554	560	630	614	582	523	535	542	523
Kentucky	349	412	418	500	499	506	548	603	580	524	532	516	545	492
Tennessee	813	852	919	1,094	1,186	1,140	1,305	1,343	1,258	1,183	1,160	1,099	1,039	962
Alabama	497	577	542	705	706	641	793	826	737	735	722	750	747	628
South Central	1,969	2,213	2,265	2,776	2,942	2,841	3,206	3,401	3,189	3,024	2,936	2,900	2,873	2,605
West South Central	152	187	218	231	317	319	383	359	366	371	333	363	326	290
Louisiana	211	256	254	262	250	275	395	330	319	318	321	303	289	277
Oklahoma	23	37	57	82	102	141	146	173	147	145	127	136	108	107
Texas	234	310	406	458	480	554	610	615	571	561	586	567	595	667
West South Central	620	789	935	1,033	1,148	1,288	1,464	1,477	1,402	1,395	1,367	1,369	1,318	1,341

KEY to graphs prepared by FARM CHEMICALS
 ↑ Silhouette indicates change from base year 1944-45 through 1957-58. Depth of figure at
 left represents 800,000 tons in geographic breakdown, and 8,000,000 tons in final total.

State & Region	1944-45	1945-46	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1957-58
Montana	9	10	12	13	9	11	21	23	26	29	24	33	44	39
Idaho	45	49	58	59	46	52	47	73	74	90	106	64	85	104
Wyoming	4	5	5	8	5	6	6	7	12	11	11	11	10	12
Colorado	17	26	27	33	36	39	51	48	49	48	49	54	59	81
New Mexico	13	10	14	12	14	19	22	19	28	22	33	29	38	39
Arizona	35	32	61	79	62	62	104	117	132	155	172	154	178	204
Utah	13	11	19	18	11	16	29	31	32	28	28	31	32	32
Nevada	0	0	1	1	1	1	1	6	11	9	3	4	7	22
Mountain	136	144	197	222	184	205	281	323	363	393	425	380	454	533
Washington	76	98	104	83	80	81	86	92	124	201	199	170	185	245
Oregon	50	74	98	87	75	97	125	120	148	147	172	170	218	191
California	944	1,018	1,221	1,203	1,072	1,037	1,449	1,627	1,752	1,526	1,834	1,914	2,128	2,173
	1,070	1,190	1,423	1,372	1,928	1,215	1,659	1,839	2,024	1,875	2,205	2,253	2,531	2,609
CONTINENTAL U. S.	13,201	14,704	16,507	17,508	18,201	17,989	20,508	22,052	23,035	22,362	22,284	21,794	22,224	21,989
Hawaii	91	111	89	99	106	115	196	116	129	140	157	166	194	136
Puerto Rico	174	212	242	248	234	250	354	964	247	271	283	233	290	233
Alaska	—	0	0	1	—	1	1	1	1	—	—	—	—	—
Territories	265	324	332	348	341	366	481	380	377	411	440	399	485	369
TOTAL	14,466	15,098	16,839	17,856	18,542	18,355	20,989	22,432	23,413	22,773	22,724	22,193	22,709	22,358

Prepared by National Plant Food Institute

Source: Agricultural Research Service, U. S. Department of Agriculture



Your Mark of Integrity and Service for Fertilizers and Fertilizer Raw Materials

Phosphate Rock

Superphosphates

Mixed Fertilizers

Potash

Nitrogenous Fertilizers

Mineral Supplements

Sulphur

Insecticides

INTERNATIONAL ORE & FERTILIZER CORP.

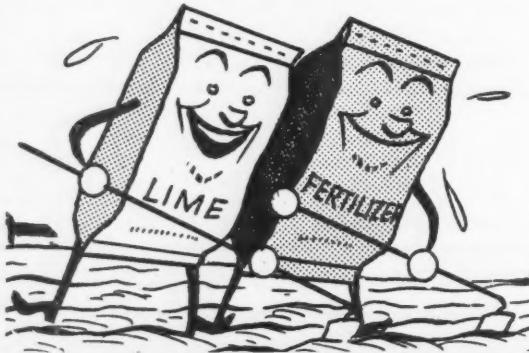
500 Fifth Ave.

New York 36, N. Y.

Divisions: Phosphate Rock Export Corp. — Seed & Feed Corp.

MERCHANDISING AIDS

PROMOTION



Fertilizer and lime drawing attracts attention in the Fertilizer Salesman's Handbook. One dealer told Sohio Chemical Company that the lime information was helping him to sell lime—"best information I ever saw."

Putting the NPFI "super salesman" to work for you

Want to build good will among your marketing area's influence groups and dealers? Here's a program that Sohio Chemical Company is finding popular in their area. It's a sure-fire attention-getter and assures great dividends for fertilizer's future. Why? Because it's not a "pitch" for business, but an educational tool.

AN AVALANCHE OF REQUESTS within ten days! That's what happened when Sohio Chemical Company of Lima, Ohio mailed out 597 letters to county agents, vocational agriculture teachers and soil conservationists telling them about the National Plant Food Institute's new "super salesman."

COPIES SENT TO "INFLUENCE" GROUPS

Sohio was so impressed with the 200-page Fertilizer Salesman's Handbook and its great potential as a promotion tool that it decided to offer a copy to every leader in the three main "influence" groups of the state.

Quick to recognize its promotional value was the company's agricultural service director, H. H. "Bert" Tucker. He told FARM CHEMICALS last month:

Less than a week after the mailing to agricultural leaders in Ohio, a total of 183 replies were received—and within 10 days the response was over 55 per cent!

Why is the Handbook making such a hit? FARM CHEMICALS feels this way about it:

THE MAGIC QUALITY—APPEAL!

Trouble with most college publications, fertilizer texts, and the reams of other fertilizer information disseminated to busy salesmen and agricultural leaders is that they don't pay much attention to them.

It's not that it's unimportant or unusable—but the stuff just seems to lack *appeal*. It isn't broken down in a language salesmen understand. Also, not enough useful information is assembled in one "package" to be of much practical value to them.

But not the Fertilizer Salesman's Handbook!

"This Fertilizer Salesman's Handbook has certainly created a great deal of interest here in Ohio," Tucker told FARM CHEMICALS. "I have shown this to county agents, vo-ag teachers and soil conservation technicians. Immediately, everyone of them wanted a copy for his own use."

"BEST LIME FORMATION EVER"

"We supplied a copy of this book to a fertilizer manufacturer here in Ohio who also manufacturers and distributes lime. His comments were that this was the best lime selling information he had ever seen.

"He was very much impressed with the sales information as far as fertilizer was concerned, but seemed to feel this had probably been better covered in the past than was the subject of lime. This lime manufacturer is obtaining eight copies for his eight lime salesmen."

Bert said that some agricultural leaders who did not see the original letter for some reason have made special requests after having talked with other leaders in their group who had received their copy.

Here are some of their comments:

A district supervisor of vocational agriculture: "I received the fertilizer salesman's guide recently and wish to thank you very much for it. It is a storehouse of useful information for salesmen, vocational agriculture instructors and others interested in farming."

Extension horticulturist: "One of my friends in the Department of Agronomy mentioned that your firm was making available to Agronomy extension workers, copies of the Fertilizer Salesman's Handbook published by the National Plant Food Institute. I am not in the habit of asking personal favors of this nature, but if you should happen to have an extra copy of this publication, we could certainly use one in this office . . ."

County agent: "Thank you so much for the 'Fertilizer Salesman's Handbook.' It will be quite useful to me, I'm sure."

A state vocational agriculture leader gave Sohio a "pat on the back" when he said that he heard it "is a rather expensive booklet, and we sincerely appreciate your willingness to make it available to teachers."

He remarked that it was a good plan to make it available only *upon request*.

"This is a good way to do it. If you send them out to all teachers, they unfortunately don't pay as much attention to it as they do if they request it," he said.

The Handbook brings together in one publication valuable information about the source of fertilizers, production of fertilizers and their use. The economics of fertilizer use is well portrayed along with useful facts, figures, terms and definitions.

Also included are sources of information, aids to selling and information to help salesmen and others to know the customer, the farmer, better.

SOHIO WANTS EXPANSION OF IDEA

Sohio has limited its distribution to the state of Ohio for two reasons: 1) the books are fairly expensive (\$1.50 singly or in quantities) and 2) they are in hopes that other producers will select regions of the country which would be their *natural marketing area* and do something of a similar nature.

The significance of the effort points up one basic, underlying fact: Agricultural leaders, who are known to have a terrific influence on buying habits of farmers, appreciate being told an unbiased, research-based story about what fertilizers can do to increase farm profits.

Even more important, however, they appreciate receiving this information in such a dynamic, effective package!

Ag leaders can actually carry this "silent partner" with them as they advise farmers, conduct classes and demonstrations. They'll be dog-eared from use! The fact that the NPFI plans to keep the loose-leaf publication up-to-date, issuing replacements or revisions from time to time, will assure constant communication between the influence groups and the industry.

Indexing the material assures easy reference to material and makes the Handbook a virtual "must."

Salesmen need this kind of support in the field. It will open the door to them wherever they go, because they will be identified with this "perfect promotion tool."

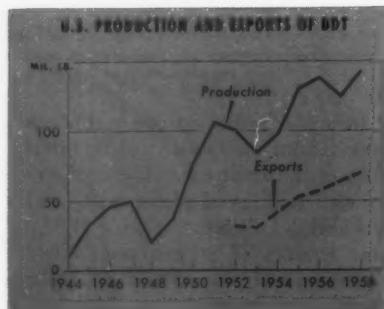
Salesmen will be proud to quote information from this beautiful manual. It will help them organize their thinking better as it creates a feeling of security and well being within the individual.

No salesman will have to be "talked into" using one of the greatest tools the industry has seen in years.

NEAT PROMOTION PACKAGE

NPFI authorities put all the information that's been "floating around" from state to state—plus some additional facts and figures, terms and definitions—into a neat package that everyone seems to feel is a must for his own professional improvement. You're just not "accepted" if you're caught without one! The Handbook is colorful (color on most pages), it's well organized, practical and refreshingly illustrated. Even charts and tables are tempting to read!

Sohio is making up its own elaborate cover—something any company can do. This super salesman is "available" for any promotion job a company may dream up. FARM CHEMICALS hopes more companies will see the value of the Fertilizer Salesman's Handbook, as we tip our hat to Sohio for the fine job it is doing in helping those who can do the industry the most good.



Value of Sprays and Dusts Handled by Farmer Cooperatives

Fiscal year	Gross value	Net value ¹
1951-52	\$1,000	\$1,000
1952-53	33,153	24,649
1953-54	34,750	23,987
1954-55	37,863	26,583
1955-56	44,731	31,857
1956-57	50,090	35,573
1957-58	57,190	40,707
	(not available until late 1959)	

¹After adjusting for duplication arising from business between cooperatives.

Source: Farmer Cooperative Service, U. S. Department of Agriculture.

Manufacturers' Stocks of Pesticides (Technical Basis)

September 30, 1958¹

Material	All stocks reported as of Sept. 30, 1958	Percentage of stocks (tech. basis) reported as formulations	1958 stocks as percentage of 1957 stocks	
			All paired reports ²	Primary producer stocks ³
Aldrin, chlordane, dieldrin, endrin, heptachlor, toxaphene	33,138	43.9	98	96
BHC, including lindane (gross basis)	33,644	—	—	93
Same (gamma basis)	8,032	25.2	122	90
Calcium arsenate	9,760	26.1	125	132
Copper fungicides	15,535	5.8	130	126
2,4-D (acid basis)	25,786	44.5	139	142
DDT	26,309	37.4	85	75
Fumigants, grain and soil	26,398	—	57	55
Lead arsenate	3,327	36.0	106	108
Miticides, miscellaneous	9,030	59.0	140	159
Organic phosphorus compounds	13,401	32.3	159	223
Sulfur, ground	26,913	50.8	95	—
2,4,5-T (acid basis)	5,308	48.4	114	96
Other fungicides	9,483	37.8	96	70
Other insecticides	13,852	72.7	90	94
Other weed killers	11,430	67.7	116	123
Miscellaneous, including rodenticides	9,320	—	—	—
Total	258,634 ⁴	48.2	96	93

¹Results of survey by U. S. Department of Agriculture in cooperation with the National Agricultural Chemicals Association, final report. ²Based on all paired reports for both technical and formulated goods (technical basis). ³Based on goods in the possession of their primary manufacturer, i.e., DDT stocks of DDT producers. ⁴BHC (gamma basis) omitted to avoid duplication.

U. S. Production of Synthetic Organic Pesticides¹

Calendar year	Production ²	Calculated producers' value
	1,000 lb.	\$1,000
1947	124,259	—
1951	463,998	—
1952	417,624	174,141
1953	355,953	130,466
1954	419,274	157,599
1955	506,376	206,035
1956	569,927	274,895
1957	511,552	214,957
1958	580,000	—

¹Includes a small proportion of plant hormones and soil conditioners. ²1947 and 1951 from Chemical and Engineering News, September 1, 1958; 1958 estimated; remaining production figures from U. S. Tariff Commission.

Aerial Application of Pesticides and Defoliants in the U. S. 1956 and 1957

Materials dispensed

Activity	Area treated		1956		1957	
	1,000 acres	1,000 acres	Dry (1,000 lb.)	Liquid (1,000 gal.)	Dry (1,000 lb.)	Liquid (1,000 gal.)
Insect control, total	38,667	46,157	198,075	57,503	215,269	64,618
Crops, orchards, etc.	28,088	30,472	196,313	49,051	213,902	51,946
Forests	4,811	10,338	262	3,211	151	7,698
Towns	5,332	2,695	246	4,614	517	2,951
Soils	436	2,652	1,254	627	699	2,723
Plant disease control	1,098	1,048	24,242	3,672	13,725	3,103
Weed control	5,641	6,904	131	9,793	12	12,112
Brush control	568	585	15	2,010	172	2,294
Defoliation	1,976	2,094	8,607	10,958	12,968	11,415
Total	47,950	56,788	231,070	83,936	242,146	93,542

Source: CAA Statistical Handbook of Civil Aviation, 1958 edition, and The Pesticide Situation for 1957-58.



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INTERNATIONAL
FULL ORBIT

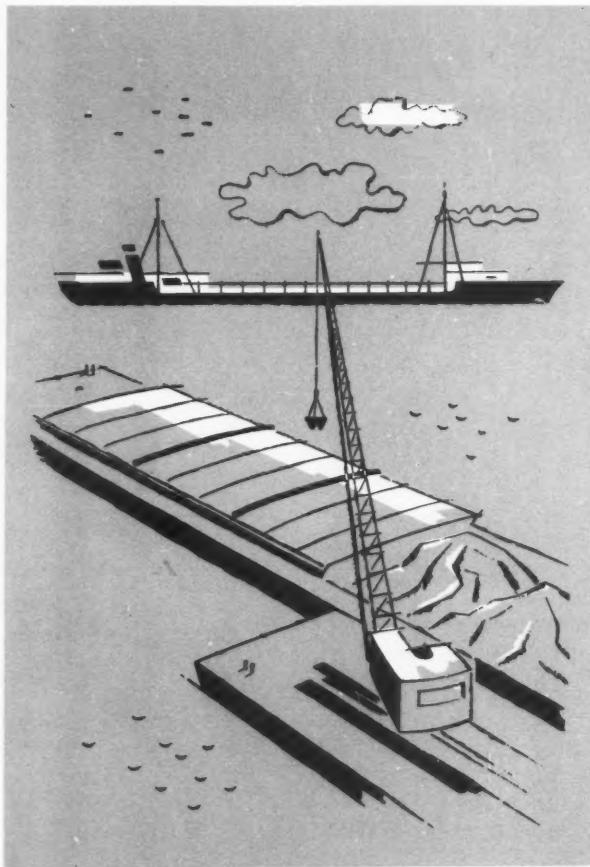
*Setting New Standards
of Customer Service*

Your IMC triple super salesmen
bring you
the **BEST**
in **PRODUCT**
and **SERVICE**



Only from International...

triple superphosphate with tr...



IMC transportation service masters the maze of shipping problems for you

Let's face it: delivery can give you skull-busting headaches . . . unless you're protected by International Minerals' General Transportation Service. IMC helps you choose lowest cost methods — ship, barge, rail. IMC offers other advantages, like on-site storage at key transportation centers and rolling warehouse shipments. We can help you with rate negotiations, routing or interpretations of shipping regulations. In short, International Minerals takes the trouble out of triple super shipping.

Triple super trouble shooters -- complete and personalized technical service at your plant

Technical trouble-shooting in the fertilizer business takes experience and personnel. And International Minerals has both — a staff of separate technicians that stands ready when you need them . . . to help cut your in-plant production problems down to size. Let us help you in formulation . . . choosing equipment . . . designing plant layouts . . . streamlining materials handling . . . or in applying research information. Call on IMC for complete trouble-shooting service that works for you *at no cost to you!*



With triple-value service



FULL ORBIT SERVICE . . . IDEAS AND PLANS TO BUILD VOLUME, PRODUCE MORE PROFIT OVER COSTS!

International Minerals' Full Orbit Service is helping fertilizer manufacturers chart new profit strategy.

It's an exciting and *proved* program that sets new standards of service in the industry. First benefit is IMC's extremely high quality triple superphosphate. Then comes Full Orbit technical help in ironing out your in-plant problems . . . plus help in a host of ways to eliminate your transportation troubles.

Full Orbit Service makes the most of buyer-supplier teamwork to help you solve marketing problems . . . get the most from your sales manpower . . . make sales meetings pay off . . . and get real results from your promotion dollars through professionally planned use of newspapers, radio and TV.

The best part is, International's Full Orbit Service doesn't cost you a cent. Contact your International representative now. There's no obligation. Find out — as many other fertilizer manufacturers have — how IMC's Triple Superphosphate and Full Orbit Service can help you realize extra profits while you benefit from a smoother working operation.

From mine to manufacturer, International's quality count-down adds up to superior product control

Nobody guards triple super quality as carefully as International Minerals. Over 40 staff of separate tests are used! More than 400 chemical analyses are made daily. IMC absolutely controls triple quality with a count-down that follows the product from raw material to shipment of the finished product. And as a final quality check, every shipment of International Triple Superphosphate has its own certificate of analysis — mailed to you before material arrives at your plant. Depend on IMC for quality.

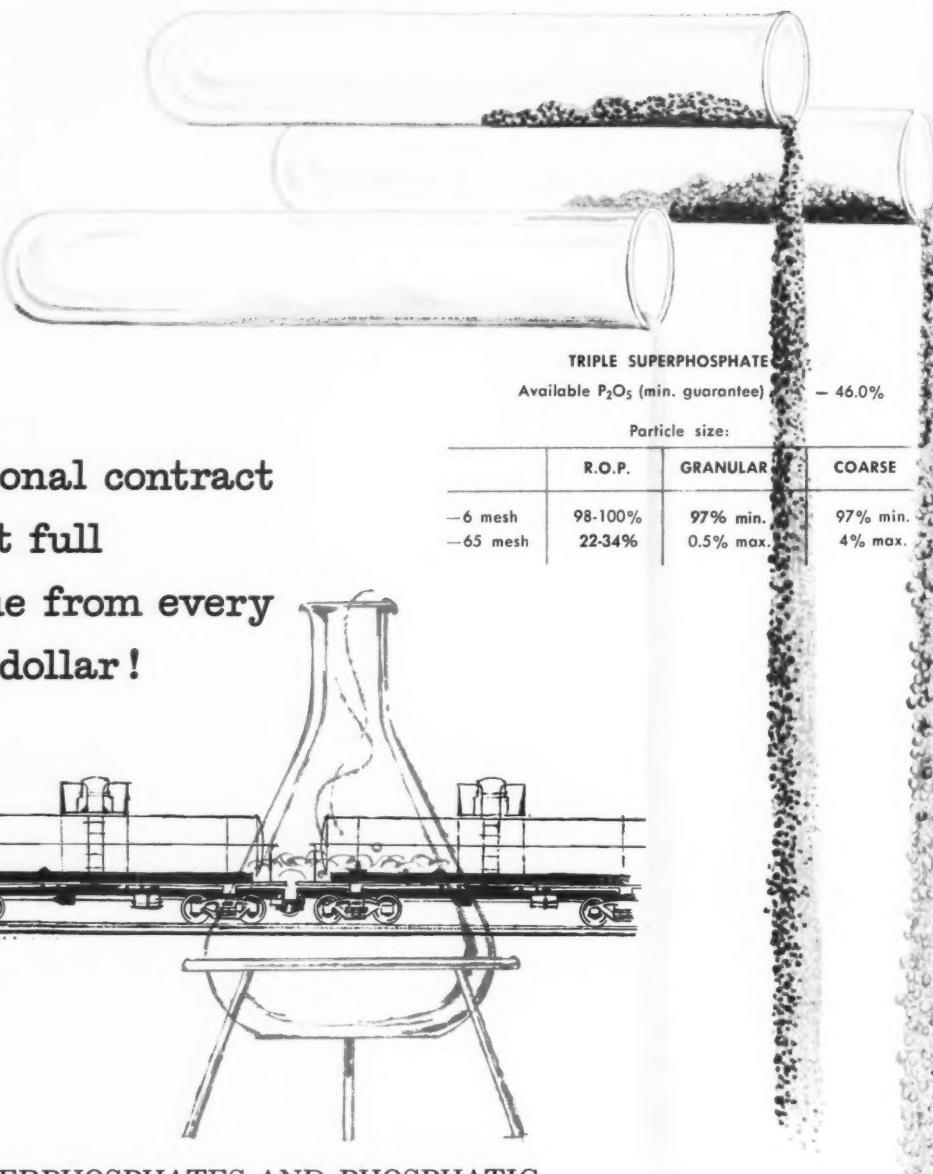


Producers of Living Minerals

COARSE — International's coarse-textured Triple gives you the same excellent ammoniation batch after batch . . . promotes desirable agglomeration.

GRANULAR — International's granular Triple is non-crumbling, free-flowing, easy to apply—makes this product ideal for direct application.

RUN-OF-PILE — International's even-textured Triple provides uniform particle size, even density and high porosity that lets you ammoniate at higher rates, temperatures.



An International contract
helps you get full
product value from every
phosphorus dollar!

IMC TRIPLE SUPERPHOSPHATES AND PHOSPHATIC FERTILIZER SOLUTION SOLVE FORMULATION PROBLEMS

Now you can make International your dependable single source of all high-analysis phosphate ingredients. Benefit from International's three grades of top-quality triple superphosphate plus high purity 53%-55% phosphatic fertilizer solution. Get all the quality advantages International's processing adds to your product. Be sure with International.



Producers of Living Minerals



SPECIAL PRODUCTS DEPT., PHOSPHATE DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Administrative Center: Skokie, Illinois

READER SERVICE

FREE INFORMATION to help you
solve fertilizer, pesticide problems

Chemicals

171—UROX FOLDER

A new folder is now available on Urox weed killer, a granular herbicide which is sprinkled or spread on soil to kill all weed growth in non-crop areas. It is reported to keep soil weed-free for 8 to 18 months and can be used anywhere where complete, low-cost kill of all vegetation is desired. The illustrated folder contains general use information and application data. To get a copy,

CIRCLE 171 ON SERVICE CARD

172—TERRACLOR GUIDE

A new Terraclor application guide for peanuts giving detailed information on effective use of this soil fungicide is now being distributed by Olin Mathieson Chemical Corp. Target of the four-page, illustrated guide is control of Southern blight. The guide is a compilation of work by OM fieldmen, federal and state research personnel and growers. If you'd like a copy

CIRCLE 172 ON SERVICE CARD

173—SEVIN ON BEANS

Use of Sevin insecticide on beans is described in a new folder now available from Union Carbide Chemicals Co., Div. of Union Carbide Corp. Advantages of the insecticide are outlined, and application rates and directions are included. Sevin controls such bean insects as Mexican bean beetle, leafhoppers, lygus bugs and stink bugs. Copies of the folder are available by

CIRCLING 173 ON SERVICE CARD

174—CACODYLIC ACID

A new use for cacodylic acid, as an herbicide to renovate pasture and sod, has been announced by Ansul Chemical Co. Tradename Arsan, the product also has possible uses as a cotton and soybean defoliant, algaecide, bactericide and fungicide, the company reports. Ansul reports that cacodylic acid has a high level of phytotoxicity, while being relatively non-toxic to mammals, and has limited residual effects in the soil, permitting its use immediately prior to seeding without apparent effect on seed germination. A 14-page technical report on the material is available. Simply

CIRCLE 174 ON SERVICE CARD

175—NITROFORM HANDBOOK FOR MANUFACTURERS

Nitroform Agricultural Chemicals has prepared a manufacturers' handbook titled "Your Blue Chip Fertilizer Program." Among its contents are a definition of Urea-Form, the importance of mole ratio in urea-forms, chemistry of urea-form polymers, activity index value,

agronomic properties of urea-form, nitrification of various nitrogen compounds. There is a question-and-answer section on the use of Nitroform in fertilizer mixtures, information on the "Blue Chip" service program, selling the turfgrass market and labeling instructions. To obtain a copy, fertilizer manufacturers only may

CIRCLE 175 ON SERVICE CARD

176—IGEPON BOOKLET

"Igepon Surfactants," a new 16-page booklet published by Antara Chemicals Sales Div. of General Aniline & Film, gives properties and uses of the company's Igepon series of anionic surfactants. The booklet states that Igepon AP-78, T-43 or T-77 promote fast wetting and stable dispersion in pesticide powders. Copies can be obtained by

CIRCLING 176 ON SERVICE CARD

177—EDUCATIONAL PROGRAMS FOR HEPTACHLOR

Copies of all materials included in the Heptachlor educational program are available from Velsicol Chemical Corp. Among the materials are a heptachlor insect control forum, a newsletter and insect control guide sheets. Your name will be placed on their mailing list if you

CIRCLE 177 ON SERVICE CARD

178—SEQUESTRENE BOOKLET

An eight-page booklet titled "Geigy Sequestrene Metal Chelates" now is available from Geigy Agricultural Chemicals. Included are sections on iron, zinc and manganese deficiency, illustrated with full-color photos showing plants and trees before and after application of chelates. Recommended rates of application are given for use of the metal chelates on agricultural crops, flowers, trees, shrubs and lawns. For your copy

CIRCLE 178 ON SERVICE CARD

Process Equipment

179—GEAR & FLUID DRIVES BOOK

Information on standardized Gearmotors, Motogears and Fluid Drives for

how to use the READER SERVICE CARD

- Circle number of literature you want
- Print or type your name, position, company and address
- Clip and mail the Service Card

industry has been combined into one new 48-page book now available from Link-Belt Co. The book describes functions of these various types of drives and provides detailed selection data, dimensions, overhung load ratings and mountings. It also lists such accessories as couplings, backstops and slide rails. Detailed engineering and selection data, with service classifications and application information, is included. For your free copy

CIRCLE 179 ON SERVICE CARD

180—BUELL CLASSIFYING SYSTEMS BROCHURE

"New Buell High Efficiency Classifying Systems" is the title of a new brochure from Buell Engineering. Centrifugal and gravitational classifier systems are described, and 13 advantages are given. Among them: high guaranteed efficiency, low power requirements, complete absence of moving parts, easily set cut point, and no pre-screening required. Sizes are available to classify from 100 pounds to 100 tons per hour of feed product. A copy of the book will be mailed to you, if you

CIRCLE 180 ON SERVICE CARD

181—BULLETIN DESCRIBES DE LAVAL SEPARATOR

A new 2-page illustrated bulletin describing its Syncro-Matic Separator with TDM control has been issued by De Laval Separator Co. The Syncro-Matic is a vibrating screen separator with controlled three dimensional motion—horizontal, vertical and gyroscopic. Pictures, specifications and blueprint diagrams are included in the bulletin, available by

CIRCLING 181 ON SERVICE CARD

182—SCREW CONVEYOR DRIVES

A new 16-page bulletin from Dodge Mfg. Corp. describes a compact screw conveyor drive, complete with speed reducer, packing gland and drive shaft, all of which mount as a unit on a trough end. Dodge reports its expanded line includes four sizes to cover most industrial applications. The bulletin includes photographs, engineering drawings with dimensions, prices and tables to facilitate selection of units and drives for various loads and speeds. The bulletin can be obtained by

CIRCLING 182 ON SERVICE CARD

183—BETE NOZZLES

A new series of high capacity nozzles called the Bete "K" series, give finer break-up and are non-clogging, according to the manufacturer, Bete Fog Nozzle,

**See pages 46, 54, 55 and 56 for information
on these Reader Service numbers:**

197—Grumman Ag Cat
198—New Spreader-Sticker
199—Controlled Volume Pump

200—Buell Classifier
201—Floor Topping
202—Plastic Faucet

Inc. The nozzles employ three separate orifices from each of which a jet impinges on a deflector plate. Here the jets are broken up and intermingled to form a full-cone spray. Made in seven standard models from 1½" to 8" pipe size, the series covers a flow rate range of 20 to 3000 gpm. For a data sheet,

CIRCLE 183 ON SERVICE CARD

184—COMPLEX FERTILIZER

Title of a new brochure from The Chemical and Industrial Corp. is "Complex Fertilizer." It describes the Sphero-dizer Process, a system for pelletizing slurries. The process differs from other pelletizing methods, C&I says, in that pellet formation and drying are carried out continuously by spraying the slurry into a falling curtain of material in a rotating drum in a hot stream of air and combustion gases. A flow sheet is included. For your copy,

CIRCLE 184 ON SERVICE CARD

Packaging

**185—"HOW TO
PACK IT"**

Information on selection of the proper corrugated packaging for a new or existing product is detailed in the revised edition of "How To Pack It", published recently by Hinde & Dauch. The 32-page, illustrated book contains two sections: one on basic corrugated box designs, the other on special designs. A copy may be obtained by

CIRCLING 185 ON SERVICE CARD

Materials Handling

186—BIN VIBRATOR CATALOG

Publication of a new catalog on "pulsating-magnet" electric vibrators for keeping stubborn bulk materials and bulk parts free flowing from bins, hoppers and chutes is announced by Syntron Co. Its 12 pages give complete descriptions, data and specifications for 14 standard vibrators. Seventeen photographs show typical installations. The company will see that you get a free copy of this catalog, if you

CIRCLE 186 ON SERVICE CARD

187—J-M VERTICONE

Johnson-March has published two bulletins in its Verticone "for dust free unloading and materials handling." Included

gal pump's all-iron construction permits it to withstand corrosive effects of liquid plant foods, reports its manufacturer, Marine Products Co. The Model 8 is self-contained with its own gasoline engine and requires no power take-off connection. More information is available.

CIRCLE 191 ON SERVICE CARD

Miscellaneous

192—HOSE FITTINGS

Complete details and illustrations of air, spray and welding hose fittings for industrial rubber hose applications are contained in a LE-HI bulletin recently issued by Hose Accessories Co. Listed are brass nipples, couplings, menders, ferrules and adapters. To obtain a copy,

CIRCLE 192 ON SERVICE CARD

193—MAINTENANCE COATINGS

Carboline Co. has released a new four page chart, "Comparison of Maintenance Coating Systems" designed to aid engineers and maintenance people in buying and specifying corrosion resistant maintenance protective coatings. The chart compares 17 standard systems, showing strong and weak points of each. Resistance ratings are listed for acid, alkali, solvent, water, weathering, flexibility, impact and abrasion, and temperature conditions. Copies may be obtained by

CIRCLING 193 ON SERVICE CARD

Application Equipment

**189—NEW SPREADER
LITERATURE**

New literature on the New Leader L-32S engine-driven combination lime and fertilizer spreader is being made available by Highway Equipment Co. This spreader spreads evenly and uniformly to both sides, as well as behind the rig, through action of engine-driven twin spinners which maintain constant speeds as regulated by the driver, reports Highway. A sister model, the L-22S, which has the same general specifications but a smaller engine, also is described in the literature. For your free copy,

CIRCLE 189 ON SERVICE CARD

**190—PRE-EMERGE
SPRAY KIT**

A pre-emerge spray kit that will fit all row crop planters has been developed by Tryco Manufacturing Co. The kit makes possible application of spray materials in a band on crop rows at the same time seed is being planted. It includes special mounting brackets that adjust to any angle, a stainless steel line strainer, hose clamps and fittings. Complete information, literature and application data is available from the company.

CIRCLE 190 ON SERVICE CARD

191—FLOMAX PUMP

Recommended for transferring or spraying liquid fertilizers, the Flomax 8 centrifugal

194—FEND CREAMS

Three new creams that provide protection against skin irritants encountered in industry have been developed by Mine Safety Appliances Co. MSA recommends Fend A-2 against water insoluble irritants; Fend I-2 against water soluble irritants such as ammonium nitrate solutions, nitric, phosphoric and sulfuric acids; and Fend S-2 against soluble and insoluble irritants, including fungicides and urea formaldehyde. A bulletin contains more information on the creams. It's yours, by

CIRCLING 194 ON SERVICE CARD

**195—LUBRICATION
BULLETIN**

A new Sun bulletin, "Lubrication of Roller and Silent Chain Drives," covers principles of lubrication, maintenance and oil selection. Tables of recommendations are included. Free copies are available. Just

CIRCLE 195 ON SERVICE CARD

**196—U. S. TESTING BULLETIN
DESCRIBES SERVICES**

A four-page bulletin from United States Testing Co. describes the firm's complete line of chemical laboratory testing and research facilities. Among the products tested are fertilizers and pesticides. Also described in the bulletin is U. S. Testing's recently announced Standards Inspection Service, a facility for providing individually inspected and calibrated laboratory apparatus and glassware. Copies are available without charge by

CIRCLING 196 ON SERVICE CARD

FARM CHEMICALS

WONDERWALLTM

cuts bag costs up to 20% for Huber Corporation



WONDERWALL
Best bag of all

"In just one of our critical shipping areas, we saved 20% in bag costs by switching to WONDERWALL", states Mr. E. M. Kreh, Director of Purchases for J. M. Huber Corporation, Hillside, N. J., the largest producer of Kaolin clay in the United States.

"WONDERWALL bags have demonstrated their strength in resisting breakage under severest transit conditions. We reduce breakage and actually save money by using a WONDERWALL that is 40 pounds lighter in basis weight than our former natural kraft multiwall."

*Clupak, Inc.'s trademark for extensible paper manufactured under its authority.

WONDERWALL is West Virginia's new, tougher multiwall that outperforms ordinary bags because it's made with Kraftsman Clupak* paper. It *stretches* and withstands punishment that breaks old-fashioned kraft. WONDERWALLS pack faster, handle easier, stack better—weigh and cost less.

See how the WONDERWALL can cut your bag costs too. Let a West Virginia representative show you. Write or call Multiwall Bag Division, West Virginia Pulp and Paper Company, 230 Park Avenue, New York 17, N. Y.

W West Virginia
Pulp and Paper

MATERIALS HANDLING CUSTOM APPLICATION

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FOR ALL ITS growth in the past five seasons, the liquid fertilizer industry has yet to emerge fully from its problem-packed cocoon. That the industry licked its major problems as fast as it did is a credit to the fast-thinking go-getters who recoiled from the punches and sparked liquids' manufacture and acceptance.

However, problems aplenty still hamstring producers and distributors: increased bulk dry application, acid costs, seasonality, and complacency. Most problems like timing, equipment, and labor will continue to arise and be solved locally.

The immature but rapidly growing industry's next five years will probably be characterized by refinement. Explorations for "something better" actually started when the liquids concept first popped into someone's head, but now that firm establishment is a thing of the past, now that liquids are booming, the search for refinement (if only for competitive reasons) will take on new impetus.

(Unfortunately, there is no corporate industry movement to learn cheaper and better ways of operation, so new products research is a matter for the individual producer. However, as growth continues and the association representing solutions

producers grows, more joint research efforts will probably be undertaken.)

DISTRIBUTION EQUIPMENT

Largest area of exploration is in distribution equipment—at least for the present. Progressive thinking is shoving metals out into left field and bringing plastics, rubber, and variations on the metal theme up to bat. In some areas of use and interest, non-metals have a two-strike price count against them, but they're batting in runs anyhow.

The non-metal approach is due in large part to three factors: the inability of cheaper metals to stand up under corrosive product, the high price of stainless steel, and the tremendous advances and ubiquity of plastics and rubber. In the case of coated metals, steel is usually the material coated (or clad or laminated) and the metal is used for rigidity and strength only.

Mild—or low carbon—steel seems to have stood up fairly well in tanks where only complete fertilizer solutions have been stored or carried. But when nitrogen solutions are contained in unprotected mild steel vessels, tank life is drastically reduced. Aluminum, on the other hand, stands nitrogen solutions

Oliver Corporation's 200-gallon fiberglass tank mounted on spray rig. The firm, which sells tanks mounted or unmounted, probably will expand into larger and smaller tanks next year.

The Oliver Corporation



well but may be corroded badly by complete liquids. Stainless steel takes both kinds but, because of its high cost, is restricted in its use.

Price on a non-metallic product which is competitive in use to a metallic one too often is compared with steel. In most instances, the steel product will come out on top—when initial price is considered alone. But also to be taken into consideration should be life expectancy, maintenance costs, repair costs, weight, etc. To compete in the liquid fertilizer equipment picture, the price of a non-metallic product should fall below that product made of aluminum.

Another smaller factor which may contribute to the swing away from metals is the steel price spiral. Plastics, however, will have a tendency to stay relatively stable in price, may go even lower on some commodities as manufacturing and fabricating methods become more refined. For instance, one basic plastics fabricator in New Jersey estimates that when his plant installs high pressure molding devices, they will be able to turn out 100 tanks a week at a half to two-thirds the present price.

Disregarding price considerations, plastics and rubber offer many advantages to liquids producers in all fields . . . and few disadvantages. Among them: shock resistance, ease and low cost of repair, low maintenance costs, light weight, and the ability of

a material to be used in many different applications with a host of liquids having widely varying properties.

FIBERGLASS TANKS

Such is the case with fiberglass. Already being used in the complete liquid fertilizer and pesticide trades, fiberglass tanks have met with enthusiasm.

If a fiberglass tank is pierced, broken, or opened up accidentally, it can be patched in the field by the user himself. Patching procedure may be likened to that used in repairing an inner tube: fiberglass fabric patch is applied to the break with resin "glue" and a catalyst. Catalyst and resin join in a localized exothermic reaction which literally welds the patch to the tank.

A Pennsylvania fiberglass tank distributor reports that one of his 200-gallon units (weight: 70 pounds) fell off a truck clocking 50 miles an hour. Only damage: the surface was scuffed. That's why some molders are calling fiberglass "tougher than steel." At least it bounces better than steel. One fiberglass researcher states that, according to his tests, one single filament of glass tested at a tensile strength of 300,000 psi. Tensile strengths of aluminum (75T) is 80,000 psi and of structural steel 40,000 psi.

The Oliver Corporation, farm tractor and equipment manufacturer, started selling fiberglass tanks for the first time this year. Demand has been so

Look What's Happening in SOLUTIONS CONTAINERS

By PETER C. CROLIUS

MATERIALS HANDLING CUSTOM APPLICATION

heavy that the company cannot keep up with orders. The standard Oliver tank is of 200-gallon capacity and is sold either alone or as part of that firm's field sprayer line.

Says an Oliver spokesman: "We're just getting experience this year with fiberglass tanks. The potential is absolutely unlimited, and we'll probably go into other sizes—both larger and smaller—after we see what this first year turns up."

Hanson Equipment Company, Beloit, Wisconsin, is also producing fiberglass containers. The smallest listed by Hanson is 50-gallons, the largest 300. The Wisconsin firm fabricates tanks in hexagonal, round, and oval shapes.

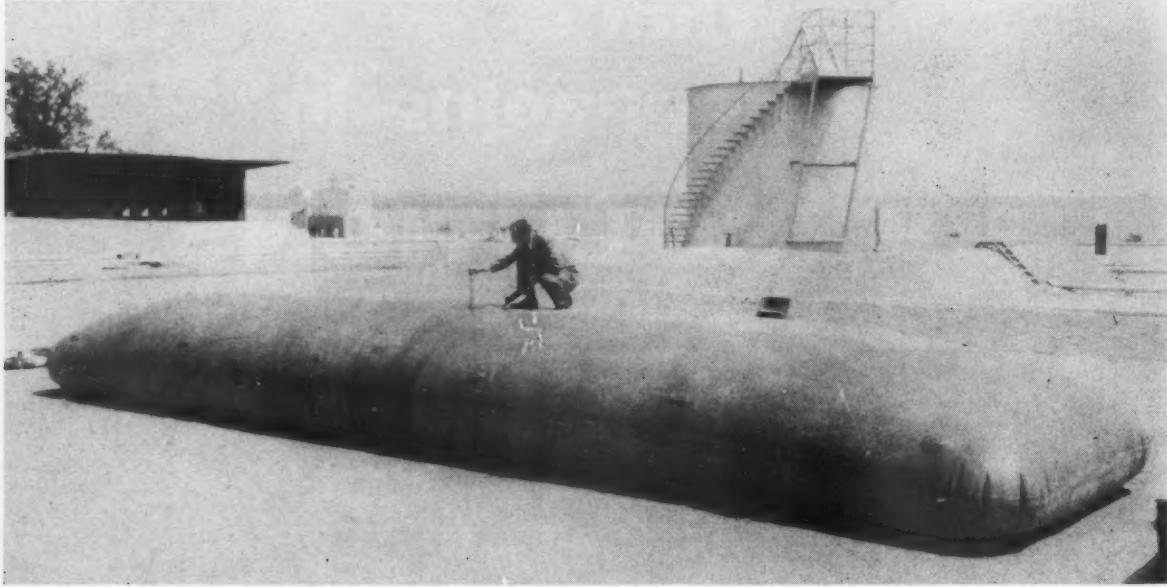
Still another producer-distributor is Food Machinery and Chemical Corp. which pioneered fiberglass tank fabrication. FMC's John Bean Division introduced 100- and 150-gallon tanks this past season and is currently selling them nationwide through dealers. A number of smaller molders also produce these tanks in various shapes and sizes. A 1000-gallon unit is the largest reported made of fiberglass alone.

Present price per gallon runs about \$1.13 for fiberglass tanks (with straps and minimum fittings) in the 100- to 300-gallon sizes. Steel tanks, however, run less than half that amount, aluminum between \$1.25 and \$1.50 per gallon, and stainless steel in excess of \$2.00 per gallon.*

The versatility of fiberglass is borne out by one company's brochure which lists solutions from acetic acid (25%) to zinc sulfate—133 solutions all told—which may be handled safely in fiberglass containers. Liquid ammonia is among the few solutions not recommended for these vessels. (A basic materials producer estimates that the U. S. fiberglass tank market for all fields is a million units per year.)

*Prices noted here and later in this article are average prices solicited from a number of manufacturers. They are for rough comparison only.

This 9,000-gallon pillow type container is made of two-ply rubber coated fabric for static storage of petroleum products. Goodyear Tire and Rubber Co.



RUBBER COLLAPSIBLES

Rubber is the second heaviest contender for the non-metal container market. Rubber-lined tanks have been used for years, and economic and practical considerations have been fully discussed elsewhere. However, synthetic rubber vessels now being looked at with interest by complete solutions distributors are the collapsibles.

There are three major producers of collapsible rubber containers: Goodyear, Firestone, and U. S. Rubber. Firestone (with "Fabritanks") has explored the fertilizer solutions market extensively and U. S. Rubber to a lesser extent (with their "Sealdtanks").

As an outgrowth of the military and aviation needs of the country, rubber collapsibles now are used to store and transport a wide variety of liquids including crude oil, gasoline, vegetable oils, molasses, milk, wine, liquid soap, low pressure gasses, salt water, and many chemicals including phosphoric acid. Their use with nitrogen and complete fertilizer solutions is entirely practical, but the unrealistic price comparison with steel poses problems.

Biggest selling points for rubber collapsibles are that they are *completely* collapsible and flexible (easily moved and stored in small bundles) and they are lightweight (in sizes over 900 gallons, about one-tenth the weight of steel tanks of equal capacity). These two advantages over other types of containers give rise to other strong points: no venting is needed during filling, transit, or emptying; the need for baffles is eliminated; tanks are quickly set up ("anywhere in minutes," reads one advertisement); easy conversion of dry cargo carriers to liquid carriers (two-way payload cuts per mile transportation costs in half).

While aimed at filling "temporary" storage needs, collapsibles may well gain recognition as permanent storage facilities—or as permanent as seasonally-troubled liquid fertilizer producers may find necessary. Tank life may run as high as 20 years depending on the kind of treatment the tank gets and the solutions



Firestone Tire and Rubber Co.
Farm worker fills speed sprayer from 1000-gallon collapsible container. Rubber tank capacities range from 55 to 100,000 gals.

contained, but average life expectancy runs between 10 and 15 years.

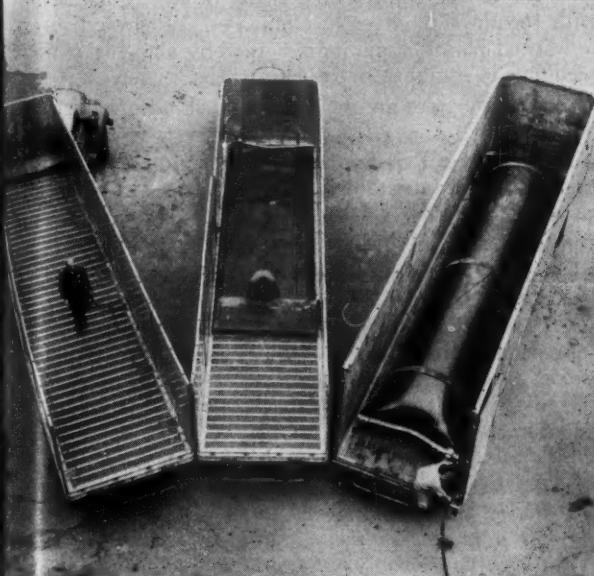
None of the major collapsible producers stock sizes over 500 gallons. They're made up as ordered. But capacities from 55-gallon Sealdrums to giant 100,000-gallon pillow type vessels can be made available.

Wall construction determines container usage. Generally speaking, one-, two-, or four-ply tanks may be used for both static storage and transport, but that's dependent on size and portability requirements. Usually emptied by gravity or pump, pressurization of collapsibles is dependent on size of tank: smaller tanks may be pressurized to 20 psi and largest (100,000-gallon) to only one pound per square inch. Burst tests carried out by Goodyear on two-ply pillow tanks revealed that 15,000 gallons could be pumped into a 10,000-gallon container before it ruptured.

The price of a 1000-gallon collapsible rubber tank (including fittings) will run somewhere between 67 cents and 90 cents per gallon. (Per gallon price drops sharply as capacity increases. For instance, one manufacturer's 20,000-gallon collapsible costs only about 17 cents a gallon.) Approximate comparative

From dry cargo to liquids is just a matter of minutes when collapsible rubber tanks are used. Transportation costs are cut in half with a payload both ways.

U. S. Rubber Co.



JUNE, 1959

costs with steel, aluminum, and stainless steel 1000-gallon tanks (less fittings, supports, etc.) look like this: 18 cents, \$1.00, and \$1.50 per gallon.

COATINGS, LININGS, LAMINATIONS

An adequate discussion of coatings, linings, and laminations for rigid containers cannot possibly be undertaken here. A science all to itself, the success of rigid container (usually steel) protection hinges on variables by the score. However, fertilizer producers report that a few substances have been investigated which may prove satisfactory and economical.

For example, du Pont's "Alathon" polyethylene resin has been used with success in packaging smaller quantities of materials for direct consumer use (inks, insecticides, photo chemicals, cleaning compounds, etc.). And collapsible Alathon bags, inserted in metal tanks and inflated as the tank is filled, are being used on a limited scale for bulk storage.

Union Carbide Plastic Company reports that polyvinyl chloride sheeting is used both as a liner for steel vessels "or can be laminated to thicknesses of approximately one inch and used as the vessel itself." PVC can be drilled, cut, tapped, and easily "worked" in other ways without heat. A Midwest firm specializing in laminations reports that PVC "can withstand corrosive action of any fertilizer type solution" . . . that initial cost of PVC protection may be up to 100 per cent higher (than steel alone) but "savings in maintenance over five to ten years should offset the higher first cost."

Epoxy resin coatings, spray or brush applied, are in successful use with a variety of chemicals. How they will stand up to liquid fertilizers has yet to be determined to anyone's satisfaction. Since epoxy resins are relatively inexpensive, they are being carefully studied.

"Teflon" spray nozzle bodies entered the pesticide field in force this year. Some thought has been given to thin-coating this material on steel tanks, although high cost of Teflon may be a deterrent. ▲

This is the John Bean tractor-mounted 150-gallon fiberglas tank. Reciprocal pump is run from spline shaft. Fiberglas tanks are lightweight, shock resistant and easy to repair.

Food Machinery & Chem. Corp., John Bean Div.



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PASTURE RENOVATION with HERBICIDES

By MILTON A. SPRAGUE*

HERBICIDES ARE FINDING a new role in agriculture, that of replacing tillage in seedbed preparation. The policing activity of selective weed killers has been a major breakthrough during the past 15 years. Their special attributes allow them to remove weeds without injury to the crop. In seedbed preparation herbicides may in another way replace costly tillage by killing unwanted plants without plowing or extensive disking.

More than 50 million acres of unimproved pasture in the humid eastern half of the United States cannot be plowed either because the area is too steep and erodable or rough and stony.

For more than 30 years, experiments and field demonstrations have established returns to be expected from renovation of these pastures. Disking, reseeding and the intelligent use of fertilizer on hilly grazing lands have on every occasion increased yields per acre from 2 to 5 and even 6 times depending on the original condition of the pasture sod. Returns from these fields are nearly as great as those from plowable fields on similar soils. *Truly, renovation of our humid area pastures represent agriculture's greatest undeveloped resource.*

Renovation consists of replacing aggressive yet low yielding plants with more productive grasses and legumes without plowing. It involves killing established plants, correcting soil nutrient deficiencies, establishing adapted forages and managing these crops so as to maintain production. In this way steep unplowable slopes which constitute from 60 to 90 per cent of the pasture land on many small farms can contribute to the farm enterprise.

The typical area for renovation in the northern humid region is predominantly a bluegrass sod with varying percentages of weedy grasses, broadleaf herbs and small white clover. On the infertile, more acid soils povertygrass and sweet vernal grass are prevalent. Annual yields of dry forage generally range from 1000 to 2500 pounds per acre, sufficient to provide feed for one cow during May and part of June. Im-

proved, these same areas can frequently provide feed for the equivalent of a cow per acre all season.

Repeated heavy disking and other surface tillage has provided an effective mulch of turned-up sod to deter erosion while new seedlings are being established. This method has been inadequate, however, in many instances because too few diskings have resulted in the old sod not being sufficiently subdued. Regrowth and competition from unskilled grasses has frequently inhibited good seedling development and much of the effort of improvement has been lost after the first year.

Extensive and timely disking is effective but difficult, dangerous and costly. In 1949 experiments were begun with sodium TCA as an herbicide to replace much of this tillage. Since that time other chemicals have been found to better meet the specifications.

WHAT THE HERBICIDE DOES

The herbicide is used to kill all live vegetation and leave a well anchored surface mulch for erosion control. Only enough tillage is required to place seed and fertilizer in the soil. Competition of weedy species with seedlings is virtually eliminated. Regrowth of unwanted plants is minimized, thereby allowing new seedlings to establish better and to last longer.

Three principles are paramount to stand establishment:

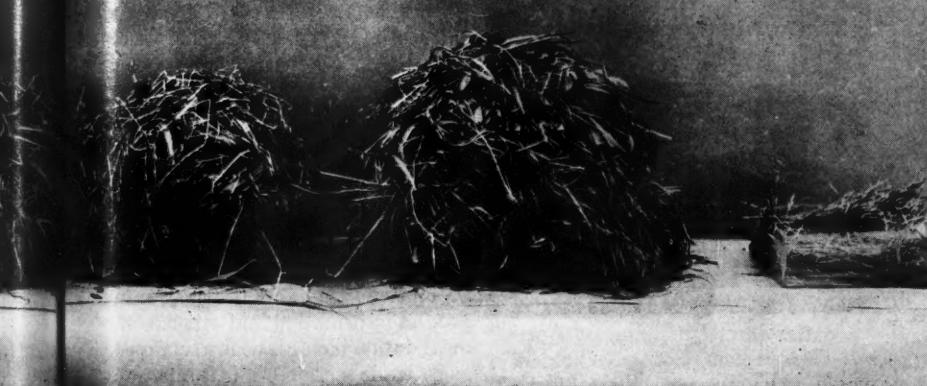
- Killing of all undesirable plants and preventing their vegetative reestablishment.
- Make soil corrections with intelligent use of lime and fertilizer.
- Provide good seed-soil contact at the proper depth for good emergence.

Chemical energy, as an herbicide, has thus been substituted for tractor energy to meet the first of these objectives. Once this has been accomplished, the tillage operations for placement of seed are easy and few.

As this is an entirely different use for an herbicide, finding the right chemical has been slow. One is needed to quickly and completely kill all vegetation without leaving a residue in the soil which will affect new seedlings. Of the many tested, amitrol at 1 pound and

*Chairman, Department of Farm Crops, New Jersey Agricultural Experiment Station, Rutgers, the State University, New Brunswick, N. J.

Disk T.C.A. No disk renovated Renovated Treatment



4X4 foot cage harvests from the 7 acre renovation trial at Annandale, N. J.

dalapon at 4 pounds per acre, applied to close grazed sods during the growing season and 3 weeks prior to seeding, have consistently done the best job.

Preliminary experiments with cacodylic acid at 2 pounds per acre on the same day as seeding and 3 weeks after an initial application of dalapon at 4 pounds looks very promising. Up to 10 pounds per acre of cacodylic acid have been used effectively on the same day as planting sudangrass without observable damage to the new seedlings. This organic arsenical, new as an herbicide, is particularly promising for use with other herbicides because of its high degree of phytotoxicity, low mammalian toxicity, and ability to seed safely soon after application. More investigation of its use is needed.

Different patterns have been used in reseeding a pasture following use of an herbicide. On Dick Cole's farm in northern New Jersey in 1955, four acres of close grazed sod were treated with dalapon and amitrol in August, disked twice, and seeded to rye and bromegrass in August. Alfalfa and ladino clover were sown on frozen ground in spring. The rye was grazed twice in the spring and clipped. In central New Jersey George Perdine used the same procedure with barley in 1956 on 10 acres of old pasture except that the barley was harvested late for grain and reseeding of clovers was necessary following a very dry summer. These are now entering their third and fourth production years and still have excellent stands with very little regrowth.

RESULTS OF ANNANDALE EXPERIMENTS

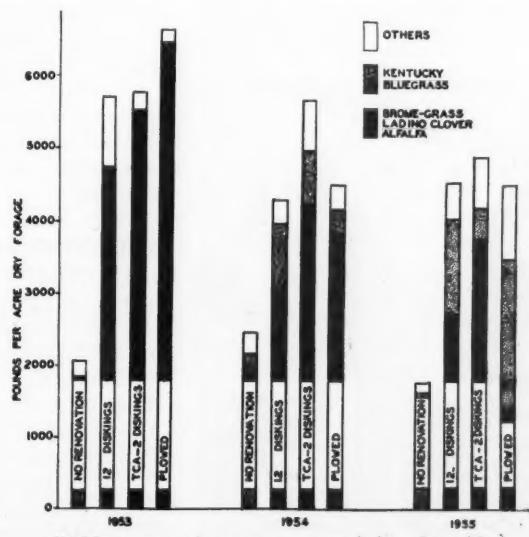
At Annandale, New Jersey an experiment compared plowing, surface disking and chemical renovation as methods of seedbed preparation in August 1952. Three years after seeding more than half the production on the plowed seedbed consisted of bluegrass regrown from the unskilled sod. About 35% regrowth was observed in the area disked 12 times and less than 10% on the sod renovated with an herbicide. Total production per acre during three years after renovation with the chemical was three times that of unrenovated areas.

On other occasions the herbicide has been applied

after a heavy early spring grazing and annual pasture crop such as sudangrass are drilled into the dead sod. Up to 3100 pounds dry matter per acre have been obtained from sudangrass alone seeded in this way indicating little loss of use of land while reseeding.

All of the seedings made in this way have shown that the more complete the kill of the perennial aggressive sod at the time of seeding, the better initial catch of seeded species and the longer the new seeding will last.

In a few areas of the country where this method has been tried, applications of the chemicals have been to dormant grasses and to sods which were not closely grazed. Some have resulted in an incomplete kill at recommended rates. New herbicides for this purpose and a better understanding of when and how to use them have been under study in New Jersey; first by R. J. Aldrich and currently by R. D. Ilnicki, both of the Weed Control in Crops Section, USDA. Considerable attention is also being given this method in New Zealand where reports indicate several hundred thousand acres have been so treated and reseeded. ▲



Yield per acre of pasture crops seeded on four different seedbeds in August, 1952. Annandale, N. J.

NEWS OF THE INDUSTRY

GRUMMAN AG CAT GOES TO FIRST U.S. OPERATOR

Grumman Aircraft Engineering Corp.'s new agricultural biplane, the Ag-Cat, has been delivered to Millis Air Service, of Accord, New York, first domestic operator to put the new plane into service.

Millis Air Service's Alden Robinson, who accepted delivery of the plane, was one of the first ag-operators to test fly a prototype of the plane in its experimental stages nearly two years ago. He has been in the aerial application business for nearly 12 years.

The Ag-Cat was demonstrated April 14 at the aircraft firm's Calverton, Long Island facility. The demonstration was conducted jointly by Grumman and Nitrogen Div., Allied Chemical Corp.

The plane was developed as an "archaic-looking biplane" to provide maximum wing area, or lift surface, with a minimum (35'8") wing span—a combination which permits making a continuous turn at slow dusting speeds, at maximum gross weight, Grumman reports.

Features of the Ag-Cat include inter-changeable upper and lower wings, a "sloping" nose which affords excellent visibility in normal flight altitude, and placement of the plane's airspeed indicator and engine tachometer on a separate panel forward of the cockpit in the pilot's "flying line of vision."

Specifications include over-all

Alden Robinson accepts delivery of Ag-Cat from Grumman's assistant Ag-Cat sales manager, Terrel Kirk.



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length of 24'8", gross weight of 3750 pounds, empty weight of 2179 pounds and a 29 cubic foot (217 gal.) hopper volume. Maximum speed in level flight: 110 mph; stall speed: 42 mph. At maximum gross weights, take-off distance is 676 feet. The airplane is being produced for Grumman by the Schweizer Aircraft Co. of Elmira, N. Y.

For free literature on the Ag-Cat, CIRCLE 197 ON SERVICE CARD

TEXAS CO. STOCKHOLDERS OKAY COMPANY NAME CHANGE

At the annual meeting on April 22, The Texas Co. stockholders voted to change the name of the firm to Texaco, Inc.

Directors declared the regular quarterly dividend of 60 cents per share, payable June 10 to stockholders of record May 6.

HOOKER DECLARES QUARTERLY DIVIDENDS

Hooker Chemical Corp.'s board of directors has declared a quarterly dividend of \$1.0625 a share on the company's \$4.25 cumulative preferred stock, payable June 26 to stockholders of record June 2. A quarterly dividend of 25 cents a share on common stock, payable May 29 to stockholders of record May 4, also was declared.

OLIN MATHIESON SALES AND PROFITS UP FROM '58

Sales of Olin Mathieson Chemical Corp. in the U. S. and Canada increased 25 per cent, and net profits rose 43 per cent in the first quarter of 1959, compared with the same period in 1958.

Net sales and operating revenues in the first quarter of this year were reported to be \$159,909,000, and net profits, \$6,395,000, or 48 cents per share.

CSC 1ST QUARTER REPORT

Commercial Solvents Corp. reports, for the quarter ended March 31, 1959, consolidated net earnings of \$665,680, equal to 24 cents on 2,741,422 shares of common stock. Earnings during the comparable quarter of 1958 totaled \$357,271 or 13 cents a share.

Sales for the 1959 quarter reached \$15,787,406, compared with \$13,294,254 during the first three months of 1958.

MONSANTO SUIT AGAINST CENTRAL FARMERS SETTLED

A suit brought by Monsanto Chemical Co. against Central Farmers Fertilizer Co., in which Monsanto charged illegal use of its trade secrets, was concluded on April 24, when Judge Fred M. Taylor of the U. S. District Court, Pocatello, Ida., signed an injunction consented to by both parties.

Under terms of the court order, Central Farmers was permanently prohibited from disclosing certain process information and other technical data which Monsanto claimed as its trade secrets. The injunction further forbids Central Farmers' using this data for a period of 10 years at any of its plants. However, the presently constructed facilities at CF's Georgetown, Ida., plant are not affected by terms of the decree. The injunction also provides reasonable inspection rights for Monsanto to insure compliance.

In announcing terms of the consent decree, Joseph J. Lanter, president of Central Farmers, and Charles Allen Thomas, president of Monsanto, said that each company would assume its own costs in the proceedings and that no damages or money payment was provided for in the settlement.

The case was related to a court action by Monsanto against a former employee, Charles M. Miller, who subsequently became an employee of Central Farmers (FARM CHEMICALS, September, 1958).

AP&CC 3-MONTH RESULTS

American Potash & Chemical Corp. registered gains in both sales and earnings for the first quarter of its fiscal year, according to President Peter Colefax.

Sales for the three months ended March 31, 1959, totaled \$12,667,913, compared with \$11,504,019 for the same period last year.

Net income amounted to \$1,112,033, compared with \$1,079,016 for the same period a year ago.

Colefax reported that the company's new coarse agricultural potash plant at Trona, Calif., was put into successful operation and shipments began in March.

The board of directors on April 28 declared a quarterly dividend of 25 cents a share on common stock,

\$1 a share on \$4 Cumulative Preferred Stock, Series A, and \$1.25 a share on Special Preferred Stock.

DOW SPONSORS STUDY TOUR PROGRAM

Dow Chemical Co. has announced its sponsorship of a unique study tour program for county agricultural agents. Designed to allow county agents to study agricultural innovations in various parts of the country, the program is being administered by the National Association of County Agricultural Agents.

Twelve county agents from the



At a planning session: Burton Seeker, Dow Chemical; Orville Walker, NACAA pres.; J. D. Pettigrew, chairman, NACAA professional improvement committee; and Walter Kirkpatrick, committee member.

North Central states will take part in the first tour under the program this July. Three weeks will be devoted to inspecting outstanding farms, community development programs, public works and research installations of interest to agriculture.

CYANAMID BEGINS CAMPAIGN TO SELL FARMER ON UREA AS A NITROGEN SOURCE

American Cyanamid Co. has launched an intensive campaign to sell the farmer on the fertilizer advantages of urea. A series of 250 demonstrations on various crops has been set up by the company in the Northeast and Midwest, according to T. R. Cox, manager of plant nutrient development for the firm's Agricultural Div.

Thirteen long-range grass fertilization and feed-out trials on grass forage are also going on under the supervision of F. A. Raymally, forage specialist.

Cyanamid has been holding farmer and dealer training meetings in conjunction with these demonstrations and an intensive advertising and sales campaign. Educational and promotional literature,

including a new 50-page handbook containing information on Aerourea, has been made available to fertilizer manufacturers, dealers and farmers.

H. H. Nau, company agronomist in charge of the demonstrations, points out that as the merits of urea nitrogen become known, increased use of other plant nutrient materials, such as lime and mixed fertilizer, also will result.

IMPROVEMENT REFLECTED IN DIAMOND SALES & EARNINGS

First quarter 1959 sales and earnings of Diamond Alkali Co. "reflect a continuation of the gradual improvement evident after the first quarter of last year," Raymond F. Evans, chairman and president, reported at the annual stockholders meeting April 16.

Net sales for the first three months of 1959 were \$29,991,716, against \$26,860,886 in the corresponding 1958 period.

Net earnings, after provision for Federal income taxes, amounted to \$2,125,901 compared with \$852,820 in the same 1958 period, equivalent to 76 cents a share against 30 cents a share a year ago.

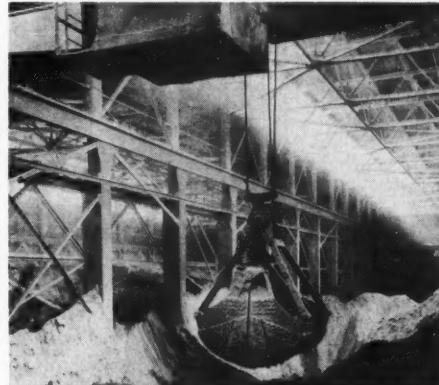
AGRICO HONORED BY MANAGEMENT INSTITUTE

The American Agricultural Chemical Co. has been recognized for the eighth consecutive year by the American Institute of Management for its "distinguished accomplishment in the ten categories of the Management Audit" conducted by AIM.

Factors bearing on the award are 1) economic function, 2) corporate structure, 3) health of earnings, 4) service to stockholders, 5) research and development, 6) directorate analysis, 7) fiscal policies, 8) production efficiency, 9) sales vigor and 10) executive evaluation.

POTASH DELIVERIES DOWN

Deliveries of potash for agriculture in the United States, Canada, Cuba, Puerto Rico and Hawaii by eight principal American producers totaled 898,743 tons of salts containing an equivalent of 523,540 K₂O during the first three months of 1959, according to the American Potash Institute. This was a decrease of 3 per cent in salts and 4



Two-line chemical plant type buckets like this are used by the Davison Chemical Div. of W. R. Grace & Co. for raw materials and product handling in its normal superphosphate plant at Curtis Bay, Md. These facilities for superphosphate production are reported to be the largest in the world under a single roof. The 3½-cubic-yard buckets, made by Blaw-Knox Co., are reeved with five parts of line and equipped with alloy steel lips and drop forged chrome nickel teeth.

per cent in K₂O from the same period in 1958.

Continental United States took 495,484 tons K₂O; Canada, 21,433 tons; Cuba, 494 tons; Puerto Rico, 1,500 tons; and Hawaii, 4,629 tons K₂O. Exports to other countries totaled 59,483 tons K₂O, an increase of 18 per cent.

Total deliveries for all purposes were 1,055,931 tons of salts containing an equivalent of 619,094 tons K₂O, a decrease of less than 1 per cent in salts and K₂O from the first quarter of 1958.

TGS REPORTS SALES GAIN IN 1ST QUARTER

Gross revenue from sales of Texas Gulf Sulphur Co. for the three months ended March 31, 1959 totaled \$14,032,634, a gain of 16 per cent over the \$12,138,178 reported for the first quarter of 1958, according to Fred M. Nelson, chairman.

Net earnings for the quarter amounted to \$3,250,556, equivalent to 32 cents a share, compared with \$3,472,487 or 35 cents a share for the same period last year.

"While tonnage sales increased, several factors affected earnings," Nelson said. "Among them were increased costs of production, shipping and delivery of sulphur, as well as increased provision for income taxes . . ."

NEWS OF THE INDUSTRY

PURDUE RESEARCHERS STUDY EFFECT OF SOIL MOISTURE ON AVAILABILITY OF POTASSIUM

Research is now being conducted by the Purdue University Agronomy Dept., studying how soil moisture affects the availability of potassium, Dr. J. B. Peterson, Purdue Agronomy head, reports.

The project is being aided by a \$7,500 grant from the American Potash Institute.

Major objects are 1) To investigate what relation there is between moisture content of the soil and the movement of potassium from a non-available to an available form and 2) To develop a method for predicting what response a crop will give to applied potassium, based on both the soil test level for potassium and the level of moisture.

FMC ADDS TO PRINCETON RESEARCH LABORATORY

Dr. Carl F. Prutton, executive vice president of the Chemical Divisions of Food Machinery and Chemical Corp., has announced start of construction of a major addition to the Central Chemical Research Laboratory at Princeton, N. J. The new wing will add more than 50 per cent to the laboratory floor space, at a cost of about \$1 million.

The recently formed Inorganic Chemicals Research and Development Dept. will occupy most of the new wing to increase product application and sales-service activities.

GAIN IN SALES AND INCOME REPORTED BY HERCULES

For the three months ended March 31, 1959, Hercules Powder Co. reports earnings on its common stock of 57 cents a share. This compares with 38 cents a share for the first quarter of 1958.

Net sales and operating revenues for the quarter were \$64,174,562 compared with \$56,805,235 for the first quarter of 1958.

DOW CHEMICAL NINE MONTHS EARNINGS REPORT

The Dow Chemical Co. has reported net income of \$41,768,855, or \$1.59 per share of common stock outstanding, for the nine months period ended Feb. 28, 1959. Sales for the period totaled \$511,353,127.

During the same period of 1958,

net income was \$36,906,021 or \$1.43 per common share, on sales totaling \$482,044,367.

HAYDEN, STONE GROUP OFFERS AAC COMMON STOCK

Public offering of 216,093 shares of common stock of American Agricultural Chemical Co. was made May 7 by a group of investment firms headed by Hayden, Stone & Co. The stock was priced at \$33.50 a share.

Proceeds from the sale of these additional shares will be added to the company's general funds. The company reports that between July 1, 1953 and March 1, 1959 it made capital expenditures of about \$31 million, and plans additional expenditures of about \$19 million in the next three years in its program for acquisition of new facilities, improvements and extension of markets.

For the eight months ended March 1, 1959, net sales were \$47,092,000 and net income \$862,000, equal to 46 cents a share, compared with \$41,519,000 and \$796,000, or 42 cents a share in the eight months ended March 2, 1958.

COLLIER ACQUIRES CHEMICAL FERTILIZER CO.

Collier Carbon and Chemical Corp. reports it has acquired all outstanding stock of Chemical Fertilizer Co., Modesto, Calif.

Although Collier controlled, Chemical Fertilizer Co. will retain its corporate identity and will continue marketing products under its brand names. CFC also will package some of Collier's Brea Brand fertilizer, a company spokesman said.

PANOCHEM CO. MOVES

Headquarters and sales offices of Panogen Co., agricultural chemical division of Morton Chemical Co., moved from Ringwood, Ill. to the Morton Salt Building, 110 N. Wacker Drive, Chicago 6, Ill. on May 4.

NEW CHEMORE OFFICES

Chemore Corp., representatives in this country and Canada for Montecatini Soc. Gen., Milan, Italy, has moved its offices to larger quarters at 2 Broadway, New York 4, N. Y.

IMC REPORTS INCREASED EARNINGS AND SALES

International Minerals & Chemical Corporation has reported net earnings of \$2,045,000 for the third fiscal quarter ended March 31, 1959, equivalent to 83 cents per share on the 2,343,327 common shares outstanding, compared with \$882,000 or 33 cents per share for the corresponding period a year ago.

Sales for the quarter just ended were \$30,722,000, up 15 per cent over the \$26,682,000 for the third quarter a year ago.

Company officials said that sales and earnings trends in the third quarter of this year were strong as contrasted to the same period a year ago, when unfavorable weather and general economic conditions deferred some normal third quarter earnings until the fourth quarter.

Net earnings for nine months ended March 31, 1959, were \$2,746,000 or \$1.05 per common share compared with \$2,520,000 or 95 cents per common share in the corresponding nine months a year ago. Sales for the nine months were \$74,377,000 compared with \$70,525,000.

Associations Meetings

ASFFCO TO MEET JUNE 9 IN ARKANSAS

On June 9 and 10, the Association of Southern Feed and Fertilizer Control Officials will meet at the Velda Rose Motel, Hot Springs, Ark., for its seventeenth annual convention.

Among the speakers and subjects:

B. D. Cloaninger, director, Dept. of Fertilizer Inspection and Analysis, Clemson Agricultural College—presidential address;

Dr. R. L. Beacher, director of the Southwestern regional office, National Plant Food Institute—“Making a Must of a Miracle;”

J. A. Noone, National Agricultural Chemicals Association—“Pesticides—Some Observations on Their Regulation;”

Woody N. Miley, extension soils specialist, Agricultural Extension Service, Little Rock, Ark.—“Value

of County & Area Fertilizer Consumption Statistics in the Agricultural Extension Service Educational Program;"

Arthur Gentry, plant manager, Arkansas Plant Food Co.—"The Effects of Developments in the Fertilizer Industry on Regulatory Programs;"

Dr. D. A. Hinkle, head, Dept. of Agronomy, Agricultural Experiment Station, University of Arkansas—"The Arkansas Soil Testing Program—Relation to Recommended Grades and the General Fertilizer Program;"

Dr. Chas. Lincoln, head, Dept. of Entomology, Agricultural Experiment Station, University of Arkansas—"Insect Control as Affected by Resistance and Formulation;" and

Grover C. Dowell, extension entomologist, Agricultural Extension Service, Little Rock—"Fertilizer-Insecticide Mixtures for Control of Soil Insects in Arkansas—Good or Bad?"

Banquet speaker will be Dr. John T. Caldwell, president of the University of Arkansas.

PROGRAM ANNOUNCED FOR CALIF. FERTILIZER CONF.

Dr. Daniel G. Aldrich, dean, College of Agriculture, University of California, will be featured speaker following the banquet at El Rancho Hotel, West Sacramento, to be held in connection with the seventh annual California Fertilizer Conference. The Soil Improvement Committee, California Fertilizer Association, is sponsor of the event. Dr. Aldrich will speak on "California's Changing Agricultural Pattern." Co-chairmen of the conference are J. H. Nelson and Earl R. Mog.

The June 29-30 program includes addresses and panel discussions on tree fruit and vine nutrition, and fertilizer placement. A tour of fertilizer research plots and greenhouses will be conducted during the afternoon of the 29th.

Nelson and Mog said there will be no registration fee, and have invited all interested persons to attend. More information and programs are available from the California Fertilizer Association, 475 Huntington Drive, San Marino, Calif.

FIRST FEMALE WINNER



Barbara Ann Freie, first girl ever to win the National Plant Food Institute Agronomy Achievement Award, receives a plaque from Dr. W. H. Pierre, head of the Iowa State College Agronomy Dept. A sophomore, Miss Freie received a \$200 scholarship and an engraved key. The plaque, inscribed with her name, remains at the college.

STUDY UNDERWAY TO FIND WHO MAKES DECISIONS ON FERTILIZER USE

A study to determine who makes the decisions about using fertilizers on California farms now is underway at the Univ. of California Davis campus, made possible by a grant of \$2,500 from the National Plant Food Institute.

The study is being conducted by two University research workers, Luverne Donker and Douglas Kleist, under the direction of Dr. Orville Thompson of the University's Dept. of Education.

"The results of this study should

have significant implications to the fertilizer industry as well as to University extension workers and to farmers," Dr. Richard B. Bahme, NPFI western regional director, said. "It is important to know whether the farmer makes the decision to use fertilizer, or whether he depends mainly on consultants and field men to determine his decision. When there is information available from fertilizer demonstration plots, for example, it is vital to know through whom this information can best be brought to the attention of the farmer."

DEL-MAR-VA ASSN. WILL CONVENE ON JUNE 27

Guest speaker for the Del-Mar-Va Peninsula Fertilizer Association annual convention June 27 will be Dr. Ralph L. Wehnt of the University of Georgia. The meeting will be held at the Hotel George Washington, Ocean City, Md.

ILLINOIS FERTILIZER INDUSTRY CONFERENCE

The University of Illinois Dept. of Agronomy has scheduled its annual Fertilizer Manufacturers Industry Conference for June 29-30 on the campus at Urbana.

S. R. Aldrich, extension agrono-

Fertilizer Economics Study at UCD



Discussing the National Plant Food Institute-sponsored fertilizer economics study at the Davis Campus of the University of California, are Dr. Chester McCorkle, associate professor of agricultural economics, who is supervising the study; Dr. Richard B. Bahme, western regional director for the Institute; Drs. Harold Carter and Gerald Dean, agricultural economics instructors engaged in the project, and Gordon Fisher, agricultural economics senior assisting in the study. "Information developed from the one-year study is to be published in a circular which will tell farmers about the benefits of proper fertilizer usage and will indicate maximum yields and profits," Dr. Bahme said.

NEWS OF THE INDUSTRY

mist, reports the program will include a review of current research on fertilizers, fertilizer recommendations and a discussion of the Illinois Fertilizer law.

The conference designed primarily for fertilizer manufacturers and their sales representatives, also will include a half-day tour of the agronomy research farm and other nearby soil fertility research.

FIVE-MINUTE SAFETY TALKS FOR FOREMEN FROM NSC

Another in its series of five-minute safety talks for foremen has been published by the National Safety Council. Book 9 contains 52 talks—one for each week of the year—written by a foreman.

Subjects range from "Mind Your Own Business" and "Never Too Wise or Too Old to Learn," to "The Wild Machine."

Further information on Book 9 and quantity prices may be obtained from the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

Calendar

June 9-10. Association of Southern Feed and Fertilizer Control Officials 17th Annual Convention, Velda Rose Motel, Hot Springs, Ark.

June 9-11. TVA pilot-plant demonstrations for fertilizer industry, Muscle Shoals laboratories, near Sheffield, Ala.

June 11-13. Manufacturing Chemists' Association Annual Meeting, The Greenbrier, White Sulphur Springs, W. Va.

June 14-17. National Plant Food Institute Annual Convention, The Greenbrier, White Sulphur Springs, W. Va.

June 15-18. Western Society of Soil Science Meeting, University of California, Davis, Calif.

June 23-25. Pacific Branch, Entomological Society of America Meeting, El Dorado Hotel, Sacramento, Calif.

June 27. Del-Mar-Va Peninsula Fertilizer Assn. Convention, Hotel George Washington, Ocean City, Md.

June 29-30. Seventh Annual California Fertilizer Conference, University of California, Davis Campus.

June 29-30. Illinois Fertilizer Industry Conference for manufacturers and their representatives, College of Agriculture, University of Illinois, Urbana.

July 7-9. Regional Fertilizer Conference, sponsored by the Pacific Northwest Plant Food Assn. and the

GALBRAITH BECOMES CFA VICE PRESIDENT

Demont W. Galbraith, president of Agriform of Northern California, Inc., has been elected vice president of the California Fertilizer Association. He fills out the term of M. M. Stockman, of the Mountain Copper Co., who resigned when his company ended its fertilizer operations.

L. M. Roberts, general manager of Shell Chemical's Ammonia Div., has been elected to serve Stockman's term on the board of directors, and John Parker, manager of Fresno Agricultural Chemicals Co., replaces Frank A. Easton.

RESULTS OF 1958 FUNGICIDE TESTS ISSUED BY SOCIETY

The American Phytopathological Society has announced publication of the "Results of 1958 Fungicide Tests."

Copies can be obtained at \$1 each from Dr. A. B. Groves, Dept. of Plant Pathology and Physiology, Winchester Fruit Research Laboratory, Rural Route 3, Winchester,

section's state colleges and universities, Winthrop Hotel, Tacoma, Wash.

July 29. Annual Kentucky Fertilizer Conference, Guignol Theater, University of Kentucky campus, Lexington.

July 31. Agronomy Field Day, University of California, Davis campus, Calif.

Aug. 3-7. Gordon Research Conference on Biochemistry and Agriculture, Kimball Union Academy, Meridian, N. H.

Aug. 18-22. Canadian Fertilizer Assn. Annual Convention, Bigwin Inn, Lake of Bays, Ontario.

Sept. 20-23. Canadian Agricultural Chemicals Assn. 7th Annual Meeting, Chateau Frontenac, Quebec City, Que.

Oct. 13-14. Western Agricultural Chemicals Assn. Fall Meeting, Villa Hotel, San Mateo, Calif.

Oct. 14-16. Pacific Northwest Plant Food Assn. Annual Convention, Chinook Hotel, Yakima, Wash.

Oct. 21-23. National Agricultural Chemicals Assn. 26th Annual Meeting, French Lick-Sheraton Hotel, French Lick, Ind.

Nov. 4-6. Fertilizer Industry Round Table, Mayflower Hotel, Washington, D. C.

Nov. 9-11. California Fertilizer Assn. Annual Convention, Fairmont Hotel, San Francisco, Calif.

Nov. 16-20. National Aviation Trades Assn. Annual Convention, New Orleans, La.

Va. All orders should be accompanied by remittances made out to the society.

RESEARCH SUMMARIZED AT CALIF. CONFERENCE

Almost 200 industry, state and Extension representatives met in April with research men at the University of California, Riverside, to learn the latest in applied entomology.

First of what is expected to be an annual series, the meeting was attended by members of the farm chemicals industry, farm advisors, extension directors and agricultural commissioners.

Dr. Robert L. Metcalf, chairman of the UCR department of entomology, stressed the need for closer liaison between researchers and pesticide distributors.

"The increasing complexity of agricultural chemicals has brought with it an increased responsibility for their correct use," Dr. Metcalf declared. "This responsibility falls directly upon the scientist, the farmer and the salesman."

Research summaries were presented by members of the department.

Among results they reported:

1) Diazinon and Sevin show promise for controlling citrus thrips in central California, while Guthion and Delnav look good in Coachella valley.

2) Effective control of citrus rust mite is obtainable with zineb, maneb, Guthion, Trithion. In addition to giving control when applied in the conventional way, chlorobenzilate gave effective citrus bud mite control when applied in two orchards by air.

3) Granular formulations of chlordane, dieldrin or heptachlor gave good control of ants on citrus, with no fruit residue or interference with beneficial insects.

4) Trithion, Guthion, Ethion, Sevin and Volck Supreme oil show promise on armored scale insects of citrus. Volck Supreme on oranges needs further investigation before trial use can be suggested.

5) Isolan and Guthion have shown promise in controlling snails on citrus.

6) A shorter waiting period between application and picking

is now approved for DDT, DDD and parathion.

7) Sevin is as effective or more so than DDT on earworm control on sweet corn. Its use around bees, however, is not recommended since it is highly toxic to them.

8) A five-year study of insecticides applied to soils showed that aldrin and lindane disappeared rapidly while DDT and toxaphene accumulated in substantial amounts.

9) A number of new insecticides appear promising for control of field crop pests. Among these are Korlan, Sevin and Dylox. The new biotic insecticide, *B. thuringiensis*, is especially effective against certain caterpillar species. Sevin increased sugar beet production about 500 pounds per acre after a single application for control of southern garden leafhopper.

10) Guthion at 2 pounds actual compound per acre and Sevin at 4 pounds actual per acre effectively control DDT-tolerant codling moth in seasonal programs on apple and pear orchards.

11) For seasonal control of European red mite on walnuts, the following give satisfactory results (actual compound per acre): Tedion, 2 pounds; Mitox, 3-4 pounds; Aramite, 2 pounds; Ovex, 5 pounds; Kelthane, 2½ pounds; Trithion, 3-4 pounds; Delnav, 3 pounds.

12) Against the eye gnat, a pest affecting people, DDT soil applications reduced numbers 90 per cent when used at 15 pounds actual material per acre. Bait sprays, with malathion, also proved feasible, suppressing populations for two to four weeks.

13) Fly control on poultry ranches was obtained by letting cockerels run free under wire cages to eat fly pupae and larvae.

AFDO ISSUES SAFETY BOOK

"Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics," by Arnold J. Lehman, et al, of the Federal Food and Drug Administration, is now available from the Association of Food and Drug Officials of the United States. Price is \$2 per copy.

Address J. F. Lakey, secretary-treasurer of the association, c/o Texas Department of Health, Austin, Tex.

People

American Cyanamid Co.

Eldon F. Loats has been appointed to the new post of resident manager in Hawaiian Islands for the firm's Agricultural Div. He will be responsible for the sale and distribution of all the division's products in the islands, headquartering in Oahu.



Loats

L. H. Butcher Co.

G. LeRoy Hillebert has been named manager, agricultural chemicals. He has been employed by L. H. Butcher since 1935 as a salesman, sales supervisor and most recently as manager, agricultural chemicals, California.

Commercial Solvents Corp.

has named Paul M. Marshall, Jr. to its expanding agricultural chemicals sales staff, according to C. T. Marshall, sales manager, CSC Agricultural Chemicals Dept. Assigned to the St. Louis district office, Marshall's territory will include Missouri and Iowa.

Cox and Gillespie. J. Samuel Gillespie, Jr., formerly an associate of Edwin Cox, chemist and chemical engineer, has been made a partner in the new firm of Cox and Gillespie. The firm has opened an office at 5 North Sixth St., Richmond, Va., in addition to its Aylett facilities.

Diamond Alkali Co. Research Dept. appointments: Dr. L. G. Utter, technical service manager for agricultural chemicals since October, 1954, becomes assistant manager, agricultural chemicals, and F. L. Dailey, a development engineer in the Product Develop-

ment Dept., is promoted to assistant manager, industrial chemicals.

Davison Chemical Div., W. R. Grace & Co.

Appointment of George Klein as sales manager, triple superphosphate, is announced by D. N. Hauserman, vice president, agricultural chemicals. Klein, who has been with Davison for 24 years, has recently been on special sales assignments.

Eastman Chemical Products, Inc.

, subsidiary of Eastman Kodak Co., has named Jesse R. Langston to head its new Chemicals Div. sales office at 17325 Northland Park Court, Detroit 35, Mich. He will represent the company in Michigan and southwest Ontario, Canada.

Federal Chemical Co. Victor C. Hemeier becomes assistant division sales manager at the Butler, Ind. plant. He has been with the fertilizer industry in Indiana for 10 years.

Florida East Coast Fertilizer Co. president, George Walter Moody, Jr., 68, died on April 22.

Grand River Chemical Div., Deere & Co. Appointment of James A. Graves as sales representative in New Mexico, southern Colorado and west Texas has been announced by John R. Taylor, Jr., sales manager. He will reside in Plainview, Tex.

Hooker Chemical Corp. Charles C. Hornbostel has been named corporate controller of Hooker. Since 1954 he had been assistant to the president of Foster Wheeler Corp.

Clark C. Sorensen joins the firm as director of public and personnel relations. Thomas H. Trimble continues as manager of public relations.

The Phosphorus Div.'s sales organization, under John B. Sutliffe, Div. sales manager, has been re-

NEWS OF THE INDUSTRY

aligned into three sections. Robert B. Boyd becomes manager, industrial sales; W. Newell Wyatt is named manager, sales administration and Harold E. Frederick continues as manager, agricultural sales.

Hubbard-Hall Chemical Co.

Raymond P. Atherton, Litchfield



Atherton

county agricultural agent since 1929, will join the staff of Hubbard-Hall's Agricultural Div. on July 1. During 33 years of extension work, Atherton has received regional and national recognition as an ag leader. In 1939 he received the Distinguished Service Certificate from the National County Agents Assn. and in 1951 was awarded a certificate of commendation for activity in "Promoting Greener Pastures."

International Minerals & Chemical Corp.

Roy Roughton, sales representative for IMC's Potash Div., died May 2 of complications resulting from injuries suffered in an auto accident, April 13.

Merck & Co., Inc.

Donald G. Smith goes to Merck's Chemical Div. as sales representative for plant products. He will work out of Lubbock, Tex., in a territory extending through parts of Texas, New Mexico, Louisiana and Mississippi. He has operated and managed a 1,000-acre irrigated cotton and grain farm in Texas, and has served in commercial cotton trade channels as buyer and salesman.

Wilson & Geo. Meyer & Co.

Jeffery W. Meyer became president of the 109-year-old firm on May 1, succeeding Wilson Meyer, who is now chairman of the board. Jeffery Meyer, 35, is the third generation in the company.

Michigan Chemical Corp.

has appointed Bruce L. Dwiggins as production superintendent of its new magnesium oxide plant at Port

St. Joe, Fla., which is expected to be on stream this July. Dwiggins has been with the company at its St. Louis, Mich. operations since 1952 when he entered the Research Dept. In 1956 he was named project development engineer.

National Aviation Trades Association.

Charles A. Parker, executive director since 1949, died April 21 in Arlington Community Hospital, Arlington, Va., of a heart attack complicated by diabetes. He was 49 years of age.

National Safety Council.

New staff member, assigned to the Fertilizer Section, is John Nahikian. He had been with Clayton and Lambert Mfg. Co., where he was assistant personnel manager and safety director.

Nitrogen Div., Allied Chemical Corp.

Thomas G. Runion has been employed as an agricultural sales representative in Illinois. He joined Nitrogen Div. upon graduation from Purdue University with a B.S. degree in agriculture. While in college, he

worked on a summer project for Purdue's Dept. of Agricultural Economics.

Union Carbide Chemicals Co.

Appointment of Carl D. Fischer as southwestern regional sales manager has been announced. With headquarters at Phoenix, Fischer will be responsible for marketing throughout

Arizona, New Mexico, West Texas and Colorado.

Westvaco Mineral Products

Div., Food Machinery and Chemical Corp. has named Edgar T. Dale as manager of its Los Angeles district office.

Government

SYNTHETIC DIET AIDS BOLL WEEVIL CONTROL

Laboratory-reared boll weevils are making possible year-round screening of new materials and methods that may ultimately provide better control of this cotton pest, USDA reports.

Raising of enough weevils for laboratory testing was made possible by a synthetic diet, developed by Norman W. Earle and his co-workers of USDA's Agricultural Research Service, at the Louisiana Agricultural Experiment Station. The diet does not require aseptic techniques.

Here are ways that a year-round supply of the weevils may be used in federal-state research efforts against the pest:

1. *Testing insecticides*, both conventional and systemic. Scientists can selectively control test insects for uniformity in age, nutritional background and resistance. They hope these research advantages will speed development of a systemic that could be applied to cotton seed to protect the young growing plants from weevils for ten weeks or longer.

Although resistance of boll weevils to chlorinated hydrocarbon insecticides has been demonstrated, scientists using the lab-reared weevils have discovered no build-up of resistance to organic phosphate insecticides in 16 generations of testing.

2. *Basic studies*. Investigation of the physiology, nutrition and morphology of the boll weevil, which may reveal basic information leading to new approaches in weevil control. The studies include research on reproduction, diapause, growth, hormones and enzyme systems.

3. *Breeding weevil-resistant cotton*. Such research is now under way at the Arkansas Agricultural Experiment Station, in cooperation with USDA, and at the department's Cotton Insects Laboratory, Stoneville, Miss.

4. *Boll weevil diseases*. Work is underway on evaluation of the effectiveness of insect pathogens in

controlling weevils, especially during hibernation.

5. *Radioactive control.* Preliminary studies are in progress to determine if boll weevils can be sterilized by gamma irradiation, without otherwise adversely affecting them. If such is the case, mass liberations of sterile weevils might afford control, as has been done with the screw-worm fly, USDA said.

6. *Mechanical control.* Research is planned to determine if mechanical destruction of weevil-infested squares that fall to the ground will afford effective control.

7. *Economic studies.* Limited research is planned to obtain more information on the cost of boll weevil control, the benefits from various control practices, the best time to start and stop insecticide application, and the value of applying insecticides at specific boll weevil infestation levels.

U.S. TO PARTICIPATE IN WORLD AGRICULTURE FAIR

The United States will participate in the World Agriculture Fair, in New Delhi, India, Dec. 11, 1959 to Feb. 14, 1960, according to a recent announcement by the U. S. Departments of Agriculture and Commerce. Heralded as one of the largest expositions of its kind ever held, it is expected to attract exhibits from most of the free world and the Soviet-bloc countries. Displays of farm machinery and other advanced equipment for efficient farming are included in exhibit plans.

MAINE FARMERS JOIN TVA DEMONSTRATION PROGRAM

Farmers in Maine will, for the first time, participate in TVA's test-demonstration farm program, that agency reports. Test-demonstration work is being initiated on 18 farms in York County. Fertilizers used in this year's program, being carried out in 30 states, include concentrated superphosphate (0-54-0), diammonium phosphate (20-52-0), ammonium phosphate nitrate (30-10-0) and ammonium nitrate (33.5-0-0). Additional fertilizers required for a balanced fertility program are obtained through regular commercial channels.

JUNE, 1959

Chemicals

GOVT. APPROVES SHORTER TIME BETWEEN MALATHION APPLICATION & HARVESTING

American Cyanamid Co., malathion manufacturer, reports that the government has approved a shorter time interval between application of malathion and harvesting.

Malathion can be applied up to one day before harvesting on to-

matoes (for control of spider and tomato russet mites); cucumbers, squash and melons (to control aphids and spider mites); pears (against codling moth, plum curculio, fruit tree leaf roller, red-banded leaf roller, mites, mealybugs and pear psylla); and brambles (to control mites, thrips, leafhoppers and Japanese beetles).

If Malathion is combined with DDT on pears, no application can be made later than 30 days before harvesting. However, malathion-

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Quality & Service Since 1939

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90% less 10 Microns**

**High in Al_2O_3 ,
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"TAKO" Airfloated — Insecticide Grade — Non-Abrasive — Free Flowing.

Compounded in your formula will excel in airplane spray dusting, less drifting of your finished product, full coverage of plant foliage, greater effectiveness in area being sprayed.

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NEWS OF THE INDUSTRY

methoxychlor combinations can be applied up to seven days before harvest, American Cyanamid reported.

USDA CLEARS SEVIN FOR ADDITIONAL USES

Acceptance of labels by USDA for use of Crag Sevin insecticide on apples, peaches, beans and potatoes has been announced by R. H. Wellman, manager, Crag Agricultural Chemicals, Union Carbide Corp.

Fruit insects which Sevin will control include codling moth, apple maggot, red-banded leaf roller, apple aphids, plum curculio, fruit tree leaf roller, periodical cicada, oriental fruit moth, peach twig borer and cat-facing insects.

Vegetable insects: Mexican bean beetle, Colorado potato beetle, leafhoppers, flea beetles, Lygus bugs and stink bugs.

Label acceptance has also been granted by USDA for use of Sevin insecticide on pears and grapes, Union Carbide Chemicals Co. reports. Sevin will be applied as a spray on pears, and as either spray or dust on grapes.

RESIDUAL DEPOSITS OF NEW INSECTICIDES CONTROL MALARIA MOSQUITOS

Residual deposits of several new insecticides gave up to 100 per cent control of malaria mosquitoes for two to 11 weeks after spray applications on interior surfaces of small farm buildings, according to USDA researchers.

Insecticides used were malathion, Diazinon, dicapthon, ronnel (organophosphorus compounds), barthrin and 2,4-dimethylbenzyl chrysanthemumate (chrysanthemumic compounds.) DDT was applied as a standard for comparison. The tests were conducted by James B. Gahan and Robert A. Hoffman of USDA's Agricultural Research Service at Stuttgart, Ark.

The scientists said malathion and Diazinon were the most effective insecticides used in the experiments. Malathion controlled nearly all mosquitoes up to 11 weeks after application, but Diazinon had lost much of its toxicity by the seventh week following treatment.

Dicapthon and ronnel were highly effective for at least two

weeks after application, the scientists continue, and partly effective for four to five weeks. Nearly all mosquitoes were killed during the first two weeks after application of barthrin and 2,4-dimethylbenzyl chrysanthemumate, but control percentages decreased rapidly in the third week. In most buildings, DDT, the standard, killed nearly all the mosquitoes until the fifth week, when its toxicity began to decrease rapidly.

NEW FUNGICIDES CONTROL BLACK SPOT ON ROSES

Scientists have obtained nearly complete control of black spot, the nation's most destructive rose disease, by using two new fungicides, Phaltan (n-trichloromethylthiophthalimide) and Cyprex (n-dodecylguanidine acetate), reports USDA.

Applied to seriously infected foliage of rose plants, each fungicide was used as part of a combination spray on experiments conducted in 1957-58 at USDA's Agricultural Research Center, Beltsville, Md.

The combination spray included either of the miticides aramite or malathion, plus both DDT and lindane. Commonly used in combination sprays, these chemicals were found to have no effect on the action of the fungicide. Their insect-killing power is not reduced by presence of the fungicide, according to USDA.

THIMET FUMES KILL ALL PEA APHIDS IN TESTS

Fumes from granules of Thimet, an organic phosphorus insecticide, killed all pea aphids on alfalfa when applied broadcast to the soil surface of small experimental plots at the rate of two pounds per acre. So reports Dr. William C. Cook of USDA's Agricultural Research Service, who conducted investigations at Walla Walla, Wash.

Dr. Cook points out that although Thimet was intended for use as a systemic, he noticed that fumes of the chemical in granular form at 2 per cent concentration proved sufficiently lethal under outdoor conditions to kill aphids as long as 10 days after application.

The experiments are preliminary, USDA pointed out, and more testing will be necessary before the treatment can be recommended for aphid control.

NEW SPREADER-STICKER MADE WITH POLYETHYLENE

A new liquid spreader-sticker made with polyethylene is being introduced by Allied Chemical's General Chemical Div.

Marketed under the trade name Plyac, the material is said to improve initial and residual effectiveness of pesticide sprays and can reduce dosages or number of applications.

Other advantages cited by General Chemical are that Plyac is non-oily and mixes well with commonly used spray materials. Because it is non-ionic, the product is not affected by hard waters, and does not react readily with other chemicals.

For more information on Plyac, CIRCLE 198 ON SERVICE CARD

KURON CLEARED FOR AQUATIC WEED CONTROL

Kuron, an herbicide produced by Dow Chemical Co. has been accepted by federal regulatory agencies for use in control of aquatic weeds in lakes. The chemical is effective for control of many of the common aquatic weeds such as water milfoil, fanwort, bladderwort and waterweed, according to Dow spokesmen.

Concentrations as low as two parts per million in lake water will effectively control aquatic weeds, Dow reported.

GARLIC EXTRACT USED TO FIGHT PLANT DISEASES

University of California researchers have discovered that treatments with garlic extract will control downy mildew of cucumber, radish and spinach; cucumber scab, early blight of tomato, bean anthracnose and other plant diseases, according to an item in the *Oakland Tribune*.

Use of garlic cloves and water extracts from garlic powder was found by Peter Ark, U.C. plant pathologist, who reports they have the following advantages: They possess strong antibacterial and antifungal properties; are cheap and easy to obtain; present no residue problems and can be stored for three years.

DYRENE REGISTRATION

Dyrene, an organic fungicide manufactured by Chemagro Corp., has been registered by USDA for

use on celery. It had previously been registered for use on tomatoes and potatoes.

Six years of research and field testing have shown Dyrene to be most effective in controlling *Rhizoctonia*, late blight and early blight on commercial varieties of celery, Chemagro said. A 50 per cent wettable powder, the fungicide is compatible with both chlorinated and organic phosphate insecticides.

FROM WORLD WAR II NERVE GASES COME 50,000 INSECTICIDES

A sword-to-ploughshare accomplishment of the chemical industry has turned deadly World War II nerve gases into materials of great benefit to the American farmer.

Dr. Robert L. Metcalf, chairman of the University of California department of entomology at Riverside, told fellow scientists that more than 50,000 new compounds for insecticidal use have resulted from the secret formulas developed during the last war by English and German chemists.

The new chemicals are completely safe to humans when properly used, but highly lethal to man's insect enemies, he said.

Addressing the southern California section of the American Chemical Society at the Roger Young Auditorium, Los Angeles, recently, Dr. Metcalf said compounding of chemicals based on nerve gases has since then "proceeded at an incredible pace."

Hundreds of chemists in eight countries, including the U.S.S.R., are synthesizing the compounds classified as organophosphorus esters, with the result that 40 or more new organophosphorus pesticides are in wide commercial use. A large part of the chemical industry's output is devoted to these compounds, which were discovered in Germany only 27 years ago, Dr. Metcalf declared.

Organophosphorus compounds can be applied to the stem or roots of plants, thus making the plant itself toxic to sucking insect pests. Seeds can be soaked in the chemical, protecting such crops as cotton, alfalfa, sugar beets and cut

flowers. Tree trunks can be coated to give the same protection.

Animals can ingest the compounds to get rid of feeding pests such as cattle grubs, Dr. Metcalf pointed out. "This development offers much promise for controlling cattle grubs, which cause damage estimated at \$100,000,000 a year in the United States.

"Similar treatments are effective against screw-worm larvae and for shorter periods against adult horn and stable flies and lice and ticks. Effective control of internal parasites of horses and sheep has also been obtained."

The war-born chemicals have another advantage, Metcalf added. Instead of having a shot-gun effect that kills all insects, harmful and beneficial alike, the organophosphorus insecticides can be used like a rifle to get at one type of insect only.

"In dealing with the recently serious spotted alfalfa aphid menace in California, this selective action of the organophosphorus chemicals was of vital importance," Metcalf noted. "Farmers were encouraged to use a systemic chemical that killed only the sucking aphid. Beneficial insects that had formerly been slaughtered by parathion and malathion were thus allowed to survive and help control the aphid."

The new compounds also look comparatively good in regard to insect resistance to insecticides, the Citrus Experiment Station scientist added.

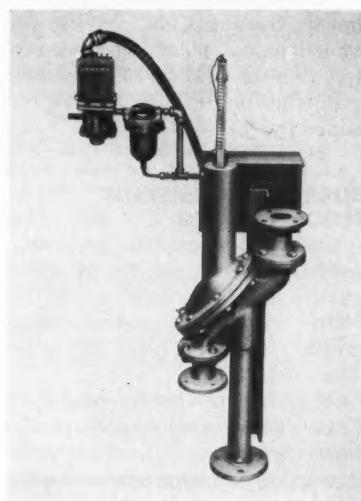
"The resistance situation with regard to the organophosphorus toxicants is perhaps a little brighter than in the case of the chlorinated hydro-carbon pesticides, if only because of the far greater variety of toxicants available," he said.

Organophosphorus compounds were first described in 1932 by two German scientists, Lange and von Kreuger. Dr. Gerhard Schrader patented a related compound in 1939. Shortly thereafter the German government declared all such research secret.

In 1945, Allied investigators turned up German formulas, which researchers elsewhere found to have unprecedented power as insecticides.

Equipment Supplies

MILTON ROY OFFERS O.D.S. CONTROLLED VOLUME PUMP



For hard-to-handle slurries of solutions, Milton Roy Co. reports it is now producing a controlled volume pump utilizing the Oliver Diaphragm Slurry Pump design principles.

The O.D.S. pump has been used for years to move corrosive and heavily concentrated slurries. Since the original pump was designed as a transfer pump, Milton Roy, under license from Dorr-Oliver Inc. has modified it to obtain controlled volume pumping.

Modifications include inclination of pump chamber to eliminate entrained air from the body automatically, and double ball check assemblies for metering accuracy. Flow volume can be varied from 0 to 180 gallons per hour.

For details,

CIRCLE 199 ON SERVICE CARD

BUELL ANNOUNCES NEW GRAVITATIONAL CLASSIFIER

Buell Engineering Co., Inc. is now offering a high-efficiency "gravitational" classifier which utilizes gravity, drag and centrifugal forces to separate dry fines from coarse materials. The unit has no moving parts, and its power consumption is reported to be extremely low because most of the energy required is to overcome draft

NEWS OF THE INDUSTRY

losses which range from 0.5 to 4" WG.

Among its uses: classifying ores, fertilizers, chemicals, salts and cry-
stals.

Buell recommends the gravitational classifier for applications where the cut point is between 50 and 10 mesh (297 to 1651 micron).

Further information may be ob-
tained by

CIRCLING 200 ON SERVICE CARD

CORROSION-RESISTANT FLOOR TOPPING

Chemi-Top, a new corrosion-
resistant floor topping for refineries,
chemical processors and other
plants with severe floor-corrosion
problems, is now being made by
The Garland Co.

According to the manufacturer,
Chemi-Top is a dense, non-porous
surfacing compound that with-
stands impact, wear and corrosive



SALE: Aluminum Tank 3000,
18,000 gallons. Steam Tube
Dryers (Tubes Removable) 6' x
50', 6' x 30', 4' x 30'. Also Mixers,
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N. KANSAS CITY, MO., BIRMINGHAM, ALA.,
TEXARKANA, ARK.

action. The compound sets up for
foot traffic overnight and for heavy
wheeled traffic over a weekend,
Garland reports.

For further information,
CIRCLE 201 ON SERVICE CARD

FLO-RITE PLASTIC FAUCET

Multi-Meter Corp. has intro-
duced a polyethylene faucet called
Flo-Rite, in metallic gold color.
Designed to fit $\frac{3}{4}$ " standard drum
openings, the faucet will give satis-
factory service in extreme cold or
temperatures up to 140° F without
breaking, softening or bending, the
manufacturer reports.

For literature,
CIRCLE 202 ON SERVICE CARD

Suppliers Briefs

Centrico Inc. A new western
division is being established to
handle distribution of Westfalia
centrifugal separators throughout
the eleven western states. Named
manager is August E. Peitzmann,
who will make his headquarters at
3315 Caxton Court, San Mateo,
Calif.

Chase Bag Co. has acquired
Nafco Bags, Oakland, Calif., from
National Automotive Fibres, Inc.
Headquarters of the Nafco Bags
Sales Div. will be 503 Market St.,
San Francisco.

Flintkote Co. Stockholders
have approved acquisition of Blue
Diamond Corporation, West Coast
gypsum producer. Terms call for
each of the 767,603 capital \$2-par
shares of Blue Diamond to be con-
verted into .802 share of Flintkote
\$5-par common, or a total of
615,617 Flintkote common shares.

Gandy Co. Appointment of
Harry R. Colvin as director of field
sales has been announced by E. S.
Gandrud, president. Before joining
Gandy, he had been with Minne-
apolis Moline for 32 years.

Highway Equipment Co. Heil
Equipment Co., 164 Market St.,
Brighton, Mass., a new distributor
for Highway, will sell and service
the New Leader line in Maine,
New Hampshire, Rhode Island and
eastern Massachusetts.

Hudson Pulp & Paper Corp.



Hazlewood

B. C. Drumm, sales manager of
the Multiwall Bag Dept., has
announced appointment of
William F. Hazlewood as
New York division manager.
Hazlewood has been serving as
district manager in New York for
the Multiwall Dept.

Richardson Scale Co. has
moved its Philadelphia district
office to 11 Park Road, Havertown,
Pa. Mailing address is P. O. Box
602.

**Southwestern Steel Con-
tainer Co.** appointments: John J.
Redmon to regional sales manager,
with headquarters in Dallas; Myr-
ven H. Cron as sales-service repre-
sentative, Houston.

Tractomotive Corp. The Na-
tional Safety Council's highest in-
dustrial safety award—the Award
of Honor—recently went to Tracto-
motive Corp. The company's in-
jury frequency rate is 77 per cent
better than construction machinery
par rates, and 97 per cent better
than par for injury severity.

Vulcan Steel Container Co.
David W. Lynch has been named
sales-service representative, with
headquarters in Birmingham. He
has been active for the past 20
years in the sale of basic insecti-
cides and chemicals to the pesticide
and sanitary supply industries.

**West Virginia Pulp & Paper
Co.** Some 25 area sales representa-
tives and district managers of the
Multiwall Bag Div. attended a
two-day meeting in St. Louis, Mo.,
April 9-10. Sessions included four
question-and-answer product fa-
miliarization clinics and a tour of
the firm's recently acquired plant
in St. Louis. The company re-
ported that while shipments of fer-
tilizer bags in 1958 were somewhat
below those of 1957, use of the
pasted valve bag had increased
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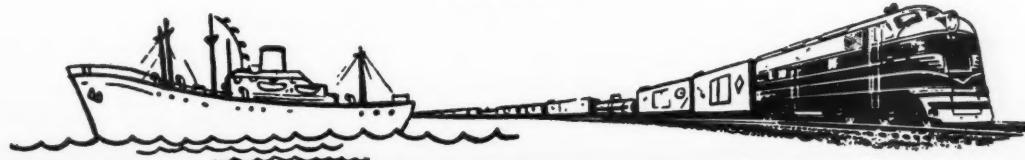
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PEST REPORTS

F

C

By Kelvin Dorward*

CEREAL AND FORAGE INSECTS ACTIVE IN APRIL

The **greenbug** was very active on small grains in parts of Oklahoma during early April, and controls were necessary on large acreages. A mid-April survey of 1,361 small grain fields in 13 north central, northwestern and panhandle Oklahoma counties showed the percentage of fields with visible damage, by counties, to range from 0 to 40. In Payne county, 40 per cent of the grain fields showed damage, Noble 19 and Kay 14. By the latter part of April treatment was on the decline, and in certain areas fields treated earlier this year were recovering. Predators and parasites were also on the buildup.

Parts of Texas also experienced trouble from the greenbug during April. Populations in Brazos and Burleson counties of central Texas were sufficient to require control measures. In the Dallas-Ft. Worth area and in Foard and Knox counties beneficial insects were prevalent enough to be of value. In some of the panhandle counties insecticidal treatments continued to be necessary during the month.

In Barber county, Kansas, the greenbug was damaging barley, and a mid-April survey of 6 south central, 5 southwestern and 2 southeastern counties showed populations ranging from 0-300 per linear foot. The largest populations were in Cowley and Sumner counties, but generally less than 10 per linear foot. Populations were rapidly increasing in southwest Missouri by the last of April. Counts of 2-150 per linear foot in wheat and 20-300 in barley were recorded. Heavy infestations of the greenbug resulted in some spotted kills of orchardgrass stands in Lawrence and Green counties, Missouri. In some of the more heavily infested counties plantings of orchardgrass were being treated.

Although some injury from the greenbug had been reported from

Arkansas, populations were generally light. The same was true for Louisiana. Heavier populations reported earlier from Alabama were decreasing.

The **pea aphid** continued to be a troublesome pest in several areas of the nation during April. Heavy infestations on vetch were reported from areas of Placer and Siskiyou counties, California. Controls on some fields of alfalfa were necessary in Douglas county, Nevada, and some damage was reported from Washington county, Utah. Pea aphids were heavy on alfalfa throughout Arizona, but by the last of April were on the decline in eastern New Mexico. Populations were increasing in Kansas with alfalfa being damaged in Montgomery and Riley counties. The aphid was increasing rapidly in red clover and alfalfa in southwestern Missouri with counts up to 200 per sweep. Some light damage on red clover was apparent by late April.

Pea aphids were present in large numbers on alfalfa throughout Arkansas with counts up to 100 per sweep. Counts of 26 per 100 sweeps were recorded from clover in White county, Illinois. Counts were also light in Virginia with the exception of Pittsylvania county where they were recorded as severe. Pennsylvania, Delaware and Maryland reported the insect as common but light.

The **spotted alfalfa aphid** caused damage in the Southwestern part of the country during April. Heavy infestations were recorded in Guadalupe county, New Mexico, and plants were being killed in the Hollis and Shattuck areas of Oklahoma. The insect was causing some injury in local areas of Utah and heavy populations were reported from Washoe county, Nevada.

Alfalfa weevil adults were common on roadside alfalfa at Clarks-ton, Washington. Alfalfa weevil activity in the west was also reported from Idaho, Wyoming and Colorado, where control was necessary in Garfield, Mesa and Montrose counties. In the eastern part of the United States activity was reported from Georgia north to Massachusetts with heavy damage

occurring in Georgia, South Carolina and Virginia on untreated alfalfa.

Grasshoppers were hatching in April in various western states. First-instar nymphs were observed in mid-April on rangeland and field margins in some Texas Panhandle counties. Light populations were recorded in New Mexico as far north as the northeastern part of the state and in Oklahoma light nymphal populations, heaviest being one per square yard, were found as far north as Beckham county. In areas of Baca and Las Animas counties, Colorado, grasshoppers averaged 0.5 per square foot but were not of economic importance in Kiowa county. Heavy hatches occurred in Kings county, California, adjacent to several thousand acres of vegetables and cotton. Hatching was also underway in Beaver, Washington and Kane counties, Utah.

OTHER INSECT ACTIVITY

Aphids affecting fruit were hatching as far north as Massachusetts by late April. Populations were light in Maryland and Delaware and normal or below in northern Virginia apple orchards. The insects were light to heavy on peach trees in areas of New Mexico, hatching on apples in Washington and abundant on neglected apple orchards in Idaho.

Mites were heavy in a few Florida citrus groves and medium on navel oranges in the Carmichael, California, area. States reporting mites as hatching by mid-April or later were Oregon, Idaho, Utah, New Mexico, Ohio, Indiana, Virginia, Maryland and Pennsylvania. Oviposition was reported from the Carbondale, Illinois area.

Truck crop insect activity was relatively light during April. Some heavy aphid populations were reported from Fresno county, California, on sugar beets and from Maricopa county, Arizona, on papa-go peas. Cabbage in southeastern Virginia was generally infested as was spinach and lettuce. Greenhouse radishes and tomatoes in Lancaster county, Pennsylvania, carried abundant populations of the **green peach aphid**. ▲

*Chief Staff Officer, Survey & Detection Operations, Plant Pest Control Div., Agricultural Research Service, USDA.

PATENT REVIEWS

F
C

INSECTICIDES, FUNGICIDES AND NEMATOCIDES

U. S. 2,871,154, issued Jan. 27, 1959 to Norman E. Searle and Dale E. Wolf, assigned to E. I. du Pont de Nemours & Co., discloses the use of certain substituted 1,2-dithiolanes and their derivatives for combatting fungi. They are particularly useful for controlling fungi which cause spoilage of fruit and vegetables.

U. S. 2,871,155, issued Jan. 27, 1959 to William Klomparens and Clement D. Vellaire, assigned to the Upjohn Co., describes a process for reducing the phytotoxicity of cycloheximide, which is an antibiotic substance having high activity against plant fungal infections, such as cherry leaf spot, wheat rust, bean anthracnose, and rose powdery mildew. The desired result is accomplished by incorporating solubilized lignin into the composition used for applying cycloheximide to the foliage of plants.

U. S. 2,872,367, issued Feb. 3, 1959 to Harry L. Haynes, Anthony A. Sousa, and Bernard B. Lampert, assigned to Union Carbide and Carbon Corp., discloses insecticidal compositions containing 9,9'-bisfluorylidene.

The compositions are suitable for use as plant sprays. They prevent attack by chewing insects upon plants, and they have high residual toxicity. They have a high margin of safety when used with plants, in that they do not burn or injure the plant and they resist weathering.

U. S. 2,872,368, issued Feb. 3, 1959 to Herbert L. Sanders, Edward A. Knaggs, and Marvin L. Nussbaum, discloses emulsifiers for use in agriculture with insecticides, herbicides, fungicides, etc.

U. S. 2,872,369, issued Feb. 3, 1959 to Gerald Robinson and assigned to General Aniline & Film Corp., discloses the use of a vinyl lower alkyl ether-maleic anhydride copolymer as a pesticide solubilizer.

U. S. 2,873,228, issued Feb. 10,

By Dr. Melvin Nord

1959 to Joe R. Willard and John F. Henahan, assigned to Food Machinery & Chemical Corp., discloses compositions which are useful as insecticides, acaricides, and ovicides. The pesticidal compounds used are of the class bis (S:(dialkoxyphosphinyl) mercapto) methanes and bis (S:(dialkoxyphosphinothioyl) mercapto) methanes.

U. S. 2,874,086, issued Feb. 17, 1959 to Winfried Kruckenberg and Bernhard Homeyer, assigned to Farbenfabriken Bayer A. G., discloses nematocides containing hydrazinobis-(dithiocarbonic acid-esters).

U. S. 2,867,561, issued Jan. 6, 1959 to Carleton B. Scott and assigned to Collier Carbon & Chemical Corp., discloses the fungicidal use of products of reaction of sulfur and tetrathiophosphates.

U. S. 2,867,562, issued Jan. 6, 1959 to Glentworth Lamb and assigned to American Cyanamid Co., discloses the use of dodecylguanidine salts as fruit tree fungicides.

U. S. 2,867,563, issued Jan. 6, 1959 to David M. Musser and Ralph Zoccolillo, assigned to Refined Products Corp., provides a phenyl mercury compound having germicidal, bactericidal, and fungicidal activity, which has a satisfactory storage life and which will not precipitate in storage containers.

U. S. 2,867,564, issued Jan. 6, 1959 to Sidney B. Richter and assigned to Velsicol Chemical Corp., discloses the use of halogenated bicycloheptyl sulfite derivatives for the control of insect and mite pests.

U. S. 2,870,056, issued Jan. 20, 1959 to Ernest G. Jaworski and Dexter B. Sharp, assigned to Monsanto Chemical Co., discloses the use of the mono-phenylhydrazones of α -diketones, α -ketoaldehydes, and α -hydroxyketones as fungicides. They are particularly effective as eradicants for wheat rust.

U. S. 2,870,058, issued Jan. 20, 1959 to Donald J. Loder, assigned

to E. I. du Pont de Nemours, discloses the use of certain fungicide-oil formulations.

U. S. 2,868,687, issued Jan. 13, 1959 to Carleton B. Scott and assigned to Collier Carbon & Chemical Corp., discloses the fungicidal and bactericidal use of the product of reaction of dimethyl tetrathio-phosphoric acid and perchloro-methyl mercaptan in the presence of an acid acceptor.

U. S. 2,868,688, issued Jan. 13, 1959 to Hans A. Benesi, Yun Pei Sun, Erwin S. Loeffler, and Kenneth D. Detling, assigned to Shell Development Co., discloses insecticidal compositions in the form of wettable dusts. An example of the toxicants used is 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-1,4,5,8-dimethanonaphthalene.

FERTILIZER PATENTS

U. S. 2,867,522, issued Jan. 6, 1959 to Leroy H. Facer, assigned to Glenn C. Cooley, Warren D. Foster, and Halfdan Gregerson, provides a method for producing mixed phosphatic fertilizer and bases from sludges. The sludges employed are generally by-products from other processes.

As an example, an intermediate unfinished liquid-containing sludge resulting from the passing of ammonia gas through sulfuric acid may be used. Phosphate rock is added to the sludge. The result is a dry, free-flowing product containing both ammonia and phosphorus.

U. S. 2,867,523, issued Jan. 6, 1959 to William A. Lutz and William T. Marston, assigned to Dorr-Oliver, Inc., discloses an improvement for increasing the production of ammonium sulfate granules.

U. S. 2,868,618, issued Jan. 13, 1959 to Fred N. Oberg and Ira M. LeBaron, assigned to U. S. Atomic Energy Commission, relates to the segregation of uranium-bearing materials from the Florida pebble phosphate field into relatively highly concentrated slurries.

U. S. 2,869,996 and **2,869,998**, issued Jan. 20, 1959 to Donald E. Vierling, provide liquid fertilizers which are effective for leaf-feeding, as well as root-feeding, pre-plow and general fertilization.

U. S. 2,872,297, issued Feb. 3, 1959 to John W. Dugan and assigned to Flo-Mix Fertilizers Corp., describes an apparatus for converting liquid anhydrous ammonia to aqua ammonia for use as a fertilizer.

The object of the invention is to increase the amount of ammonia which can be absorbed and retained in solution by water. The factor tending to interfere is the heat of solution of ammonia in water, which tends to increase the temperature of the solution and hence decrease the solubility of ammonia. This is counteracted in the present invention by taking advantage of the cooling effect which occurs when gaseous ammonia under pressure is reduced in pressure.

HERBICIDE COMPOUNDS

U. S. 2,867,519, issued Jan. 6, 1959 to Jeffery H. Bartlett, William H. Brugmann, Jr., and Arnold J. Morway, assigned to Esso Research & Engineering Co., discloses the use, as herbicides, of grease compositions containing salts of halogenated aryloxyalkyl carboxylic acids.

U. S. 2,868,633, issued Jan. 13, 1959 to Lyle D. Goodhue and assigned to Phillips Petroleum Co., discloses the use of certain sulfenamide or thiosulfenamide compounds as herbicides. They are particularly useful for controlling Bermuda grass growth.

U. S. 2,868,634, issued Jan. 13, 1959 to Charles F. Krewson and Edward J. Sagesse, assigned to the Secretary of Agriculture, discloses the use of terpene phenoxyacetate compounds as herbicides. They are particularly useful as mesquite killers.

U. S. 2,864,684, issued Dec. 16, 1958 to Angelo J. Spezzale, assigned to Monsanto Chemical Co., discloses the use as herbicides of N,N'-ethylene bis(α -chloroacetamide) and related compounds.

TREATING FERTILIZER SLUDGES

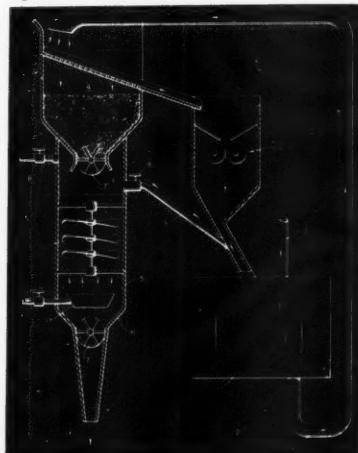
U. S. 2,871,575, issued Feb. 3, 1959 to Paul Dupont, assigned to Societe Anonyme des Manufactures des Glaces et Produits Chimiques de Saint-Gobain, describes an apparatus for treatment of fertilizer sludges with air for the purposes of drying and classification of the fertilizer particles.

In Fig. 1, the numeral 1 represents a granulator which is supplied with a fertilizer sludge or paste through conduit 2. From the granulator, the granulated material, still hot and moist, passes to a screen 4. The oversize particles roll down the face of the screen to a crusher 10, where they are reduced in size and returned to the granulator. The medium sized and fine particles pass through the screen and into a hopper 15, and then into a vertical tube 5 containing an agitator 11.

The tube 5 is provided at its bottom with a hopper 16 closed by a rotary discharge valve 7 which discharges the fertilizer at regular intervals. The rate of admission of material at the top and of discharge at the bottom of the tube 5 are correlated so that the bed of granular material is maintained at constant depth in the tube.

A pipe 6 enters through the side of the tube and is provided with a head 17 through which a blast of air is driven upward through the column of granules in the tube. The bottom of funnel 15 is supplied with the same type of feeding device 7' as is found at the bottom of the tube so that the regular

Figure 1.



operation of these devices admits and discharges the same amounts of material at the same time. At the same time, the air admitted through head 17 passes upward through the granular material and out at valve 18 with the fines, valve 8 then being closed. The fines are taken from valve 18 and are separated by the air and returned to another part of the process.

The combination of the rotary agitator 11 with the blast of air vastly improves the uniformity and the speed of the drying and prevents the formation of agglomerates.

If it is not desired to transport the fines through valve 18 to another part of the system, valve 18 is closed, valve 8 is opened, and the fines are taken off through conduit 9 and admitted to the granulator 1 as seeding material.

SOIL CONDITIONING

U. S. 2,874,035, issued Feb. 17, 1959 to Hermann Mayer-Krapoll, assigned to Ruhr-Stickstoff A. G., describes a process for improving and reconditioning forest soil.

The process consists of supplying ammonia-nitrogen to the crude humus top soil, in an amount between 10 and 15% of the nitrogen content of the crude humus.

The favorable effect lasts for about 10 years.

Apparently only ammonia-nitrogen is capable of activating the blocked inactive nitrogen present in crude humus of forest soil as a result of stimulation of the activity of microorganisms present in the humus.

U. S. 2,866,296, issued Dec. 30, 1959 to Geoffrey W. Meadows and assigned to E. I. du Pont de Nemours & Co., describes a process for conditioning soil for growing plants by utilizing polysaccharide esters of polybasic acids.

U. S. 2,686,758, issued Jan. 13, 1959 to Edgar B. Baker and assigned to Stauffer Chemical Co., discloses a method of conditioning soil in which the treating agent consists of aluminum or iron sulfate, nitrate or chloride, and an organic soil stabilizing compound such as hydrolyzed polyacrylonitrile. ▲

TECHNICAL REVIEW

F
C

New Approaches to COTTON INSECT CO

By T. B. DAVICH*

ONE OF THE DEFINITIONS of new is "beginning again." Approach has been defined as "come near in time." On the basis of being allowed these definitions of two key words in the title, I should like to discuss briefly some of the many research ideas now in various stages of development in cotton insect control. Because of its paramount importance in damage to cotton most of the remarks presented here will be restricted to the boll weevil. However, many of the ideas may apply to other cotton insects.

The ideas and the research status of various projects were obtained in discussions with, and from various reports of, many people actively engaged in cotton insect research. It is regrettable that space does not permit crediting individuals involved.

The classical divisions of insect control measures have been grouped under two major headings: Applied Control and Natural Control.

APPLIED CONTROL

1. Chemical
2. Mechanical (and Physical)
3. Cultural
4. Biological
5. Legal

NATURAL CONTROL

1. Climatic Factors
2. Topographic Features
3. Predators and Parasites
4. Diseases

Natural control usually is thought of as those measures which do not depend upon man for their success. For this reason natural control measures are not included.

Present and contemplated entomological research efforts to devise new approaches to cotton insect control can be placed under one, or more, of the first four measures under applied control; namely, chemical, mechanical, cultural, and biological. No new approaches which would involve primarily, legal measures have suggested themselves as being amenable to exploration by entomological research methods.

These new approaches now are in varying stages of planning or research:

NEW APPROACH

1. Systemic
2. Plant resistance—genetic
3. Plant resistance—chemically induced
4. Sterile male technique
5. Attractancy-Repellancy
6. Infested square destruction
7. New insecticides and formulations
8. Hormones and antimetabolites
9. Native habitat study
10. Diapause

MAJOR CONTROL MEASURE

Chemical
Cultural
Chemical
Biological
Chemical
Mechanical-Chemical
Chemical
Chemical
Biological
Chemical-Cultural

Insecticidal chemicals that are absorbed and translocated in plants have been described as systemic. Although this concept of insect control is old, the term "systemic" and the bulk of research efforts expended on this approach are relatively recent.

On cotton most of the research effort using systemics has been aimed at seed treatment. As a result of this effort Thimet and Di-Syston, both organophosphorus compounds, are being used in varying degree as seed treatments.

Both materials are effective in the control of various early season insect pests. Neither material will control the boll weevil for 10 weeks. Ten weeks is the length of time which cotton entomologists estimate is necessary for a plant grown from treated seed to remain toxic to overwintered boll weevils in order to give effective control. Thimet is not translocated to squares in sufficient quantity to kill weevil larvae, although squares have been shown to be toxic to the cotton aphid following drench applications to roots of squaring plants.

Laboratory tests indicate that 1.0 p.p.m. of Thimet in the diet will inhibit completely larval development. An intensified research effort is in progress with the ultimate goal of finding ways and means of getting 1.0 p.p.m. of an organic phosphate insecticide into the square. Some of the problems associated with this end goal are: Availability of the chemical to the plant, absorption, translocation, retranslocation, metabolic breakdown, effectiveness of metabolites and systemic extenders.

Host plant resistance to insect attack is a fascinating subject and one which has been very productive for some crops. Painter, in his book, "Insect Resistance in Crop Plants," divides the phenomena of host plant resistance as seen in the field into three bases:

PREFERENCE

For food
or
oviposition

ANTIBIOSIS

Adverse effect
of plant
on insect

TOLERANCE

Repair, recovery,
ability to
withstand infestation

*USDA and Texas Agricultural Experiment Station, College Station, Tex. Presented before the Beltwide Cotton Production Conference, Dec. 17-19, at Houston, Tex.

INSECT CONTROL

The host plant resistance approach to boll weevil control is relatively new, at least with respect to an integrated plant breeding program. The single exception to this was the breeding of early maturing varieties. This made use of the principle of host evasion. Other than this, a number of factors associated with resistance were studied, but not followed through in a breeding program. Some of these factors, all relating to preference, were: boll wall thickness, toughness of the carpel lining, cotton leaf color preference, and hairy stems and leaves. One antibiosis factor was studied—the ability of plant cells to proliferate and crush the boll weevil egg or developing larva.

Breeding programs now are in progress at a few locations. Plant color, hairiness and pigment glands are characteristics being evaluated with respect to the non-preference factor. A number of stations are searching for other characteristics which might provide leads for the plant breeding approach to weevil control.

Chemically induced plant resistance is a new concept of insect control. Basically it is an extension of the systemic principle. There are two main premises inherent in this new approach. The first of these is . . . a compound or mixture of compounds can be absorbed by the plant and be effective at the desired site of action. The second premise, which includes but goes beyond the systemic approach is . . . such compounds would have an adverse effect on the biology of the insect. Absorption of such compounds may occur through the seed or root system of the plant. Absorption by these pathways means that the compounds would have to be translocated to the desired site of action. Direct application to foliage would involve more localized absorption and translocation of such compounds.

The first premise in this new approach—compound absorption by the plant with effectiveness at a desired location—was demonstrated with the advent of systemic insecticides.

The second premise—that such introduced compounds would have an adverse effect on the biology of the insect—has not been proved in the cotton. These adverse biological effects may take one or more of the following forms: egg hatch may be inhibited; larvae may fail to complete their development because of a nutrient withdraw effect, or fail to molt because of a hormonal effect; pupal development may be prevented; adult emergence may be prolonged excessively. Another possible adverse effect is one of repellency. The plant may become unacceptable as a food source. There is evidence, from laboratory

work, that the last named adverse effect is a distinct possibility.

Chemically induced plant resistance, as a new approach to insect control, has been given a high priority at one cotton insect laboratory.

GAMMA IRRADIATION ATTEMPTED

The newest approach to insect control is the use of male insects made sterile by gamma irradiation. The sterile males mate with normal females, thereby causing them to lay infertile eggs and thus gradually deplete the population. The success in screw-worm eradication being experienced in the Southeastern United States, using this technique, has prompted cotton entomologists to look into this method as a new approach to boll weevil control.

Preliminary data on irradiation effects indicate that a radiation dose of 10,000 roentgens will result only in a transient sterility in male boll weevils. In a single test infertile eggs were laid for two and one-half weeks. After this initial period of transient sterility, 13 per cent of the eggs hatched normally.

Against females, 7500 roentgens resulted in only a slight depression of the fertile to infertile egg ratio. Mating behavior and longevity appeared normal in young irradiated weevils. In older weevils the mortality was high at 5,000, 10,000, and 15,000 roentgens. These studies are of a preliminary nature and much more work needs to be done before it can be determined if the sterile male technique may find use in boll weevil control.

The attractancy-repellency approach, successful with certain insects, has not been investigated sufficiently with the boll weevil. One of the arguments favoring the presence of a powerful attractant in the cotton plant is that the boll weevil, for all practical purposes, is an obligatory cotton parasite.

A few naturally occurring materials and chemical compounds have been found to possess a moderate degree of attractiveness under laboratory conditions. Field tests with these materials resulted in failure. All efforts to develop a technique that would give a reliable and reproducible response to candidate attractants or repellents have resulted in failure. At the present time only a long-term feeding response appears to be suitable for such studies. This development arose from research aimed at devising an artificial diet for boll weevil adults.

An attractive diet was devised, although egg production on it is practically nil. The addition of extracts and plant parts from cotton did not enhance the attractiveness of this basal diet so far as the feeding response was concerned. However, the addition of dried alfalfa meal or a concentrate of forage juices to this normally attractive diet resulted in a marked repellent response. In 7 to 10 days not a single feeding puncture was observed when either of these two materials was added to the diet. All of the weevils died, presumably of starvation.

A project has been initiated recently with the object of identifying the supposed attractant in the cotton plant.

Destruction of infested squares as a control method was investigated a number of years ago. The experi-

TECHNICAL REVIEW

mental error was so great that the data obtained was inconclusive.

Theoretically, this approach has excellent possibilities. Larvae and pupae present in squares hanging from the plant are subject to a much higher degree of parasitism than those in fallen squares. The vast majority of weevil infested squares drop from the plant. Population build-ups result primarily from adult emergence from fallen squares.

If a way could be found to destroy a large percentage of the early fallen squares, or to kill the weevils developing in them, a damaging infestation would not occur, theoretically, until well past the time ordinarily needed for chemical control measures.

Work has been initiated to determine the relationship between fallen square destruction and subsequent weevil populations. This information should be of value to agricultural engineers in designing machinery for fallen square destruction and to entomologists in insecticide screening programs aimed at killing living forms in fallen squares.

HIT-AND-MISS TECHNIQUES

To the writer's knowledge, no chemical laboratory has pinpointed the boll weevil as the primary insect in a program of synthesizing new compounds or devising more effective formulations. This is the reason new insecticides and formulations is considered here as a new approach to boll weevil control.

Initial screening of new compounds has been against easily-reared insects. Formulation research has been directed at such factors as emulsion stability, prevention of active ingredient breakdown, reduction of phytotoxicity, etc.

Evaluation of new materials and formulations on cotton, against the boll weevil, of necessity followed a broad primary screening and formulation research program based almost entirely on a hit-and-miss technique.

Within the not-too-distant future we expect to have an economical method for rearing the boll weevil. This should help make possible a new compound synthesis and formulation approach devoted primarily to this insect. *See page 52 for news of Synthetic diet.—Ed.*

Hormones and antimetabolites have received little attention with respect to cotton insect control measures. One laboratory now is engaged in a study of hormones in the boll weevil. Some recently popularized articles, reporting on insect hormone research, have shown high optimism for control and eradication using hormones. Initial research indicates these hormones to be relatively simple chemically and not species specific. The "juvenile hormone," since it inhibits molting and, consequently, the formation of the reproducing adult stages, appears to offer an entirely new approach to insect control. This should be an interesting facet of applied research in cotton insects in the near future.

The development and use of antimetabolites as a control measure for insects is virtually unknown. A chemically defined diet is a prerequisite for research aimed in this direction. Until such a diet is devised for the boll weevil one can only speculate on the applicability of this new approach. One possible application might be in plant breeding for high antimetabolite levels in the plant.

An ecological study of the boll weevil in its native habitat may result in finding effective parasites, predators or diseases not present in the United States. A number of species have been effectively controlled by using this measure. This approach has been discussed with the boll weevil research advisory committee. We have hopes that it will be explored.

THE 'DIAPAUSE' APPROACH

Utilization of the diapause phenomenon, as a new approach to insect control, is receiving a great deal of attention by cotton entomologists. The term diapause refers to the state of arrested growth or reproduction that is typical of many hibernating arthropods. In the boll weevil, diapause exhibits two major physiological expressions. The first is a cessation of reproductive activity. In the female the reproductive organs become shortened and atrophied, while in the male spermatogenesis ceases.

The second major physiological expression is the high fat content of weevils in diapause. The fat accumulation undoubtedly serves the weevil as an energy storage mechanism, enabling it to survive the winter.

Present evidence indicates it takes the boll weevil 3 weeks, or more, to accumulate the fat reserves required for successfully entering diapause, and surviving winter hibernation.

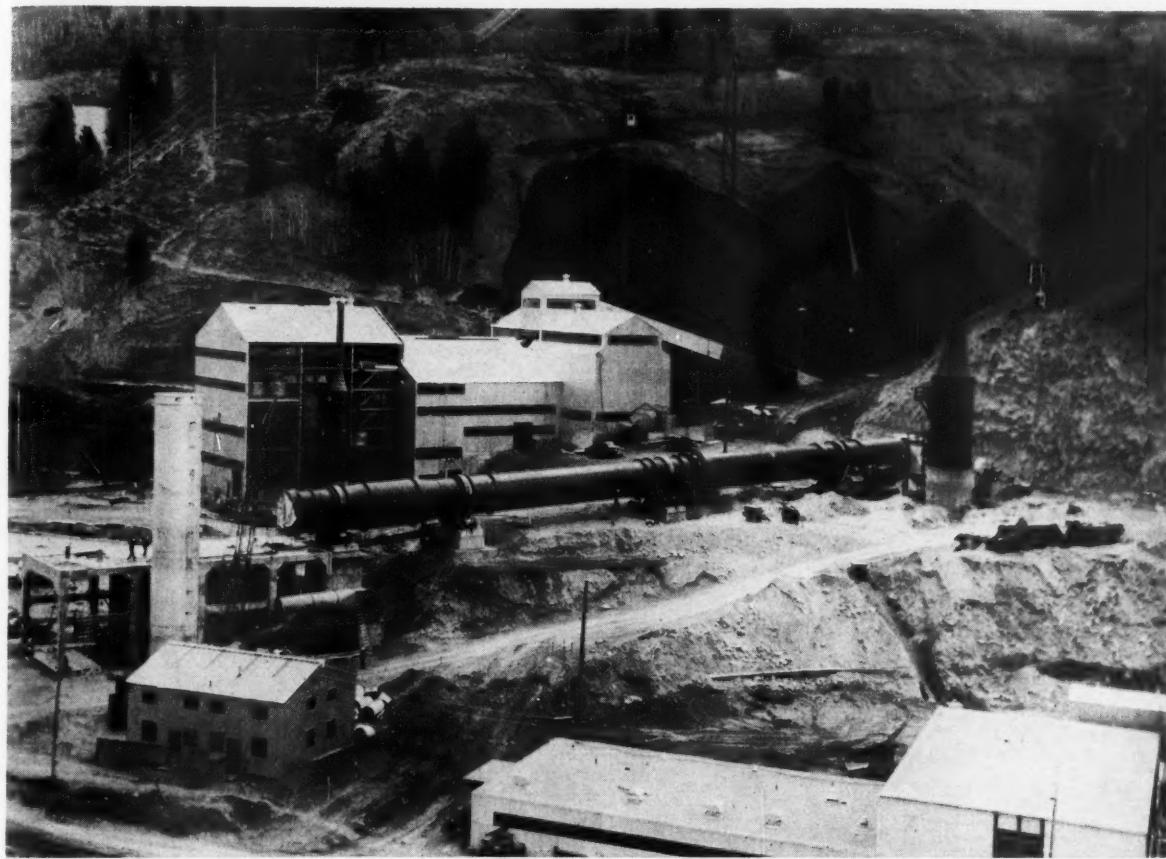
This phenomenon presents entomologists with a "weak link" in the life history of the boll weevil. An intensive research program is in progress to exploit this "weak link." We have every reason to expect this new approach to result in a markedly efficient control measure. Eradication of the boll weevil, using the diapause phenomenon as the "heart" of a program, is theoretically possible.

Weevils begin entering winter quarters in mid-summer, depending upon a number of factors. The peak population entry, in mid-Texas, occurs about the time cotton is being picked. In other words, our spring crop of weevils was reared after termination of the usual control program followed the previous summer. It would appear logical, then, to do one, or both, of two things to greatly reduce, or possibly even eliminate, the weevil population entering diapause:

- continue an effective chemical control program until the first killing frost, or
- continue an effective chemical control program until the stalks are destroyed.

Unlike the chlorinated hydrocarbons, the organophosphorus compounds do not exhibit a significant reduction in insecticidal activity against fat weevils. Now is there any evidence, thus far, of boll weevil resistance to calcium arsenate or the organic phosphate insecticides. It appears that either calcium arsenate or an effective organic phosphate insecticide could be utilized in this approach.

Admittedly the diapause approach is optimistic. However, preliminary research results are very encouraging. Within the next year or two we should know the entomological limitations, if any, on this new approach. At present, it offers more immediate promise than any of the other approaches which were discussed. Preliminary results indicate that a 10-day interval between insecticide applications will effectively eliminate the occurrence of diapausing weevils in a closed population. ▲



"PHOSPHORIA GULCH"

in Georgetown Canyon, near Montpelier, Idaho, is site for the \$16 million phosphate plant of Central Farmers Fertilizers Co. Owned by 22 farm coops, the plant is the first outside TVA to use elemental phosphorus in producing high analysis superphosphate.

By ROBERT ELLEFSEN

TWENTY-TWO farm co-operatives are attracting nation-wide attention with their 16-million-dollar phosphate plant in Georgetown Canyon near Montpelier, Idaho.

The Central Farmers Fertilizer Co. represents a major step of the farm co-operatives into phosphate fertilizer processing in competition with chemical companies.

The project also marks the first time outside of the Tennessee Valley Authority that anyone in the chemical fertilizer business has attempted to produce high analysis

superphosphate by use of elemental phosphorus.

The "wet" or sulfuric acid method is used for most commercial treble superphosphates.

FORMED TWO YEARS AGO

Central Farmers Fertilizer Co. was organized two years ago with 14 co-operative units and now includes the Western Fertilizer Assn. and other area co-operatives, thus gaining additional reserves of phosphate ores in the southern Idaho portion of the Tri-State phosphate district.

Officials have announced that the firm will not produce calcium meta-phosphate at this time. The company's research department in Chicago is continuing studies on uses of this very high analysis phosphate fertilizer now being produced experimentally by TVA for sale in acid-soil areas of the Midwest.

An 800-ton-a-day beneficiation unit at Central Farmers will upgrade phosphate ore running an average of 26 per cent P_2O_5 (phos-

(Continued on next page)

PRODUCTION METHODS

PHOSPHORIA GULCH

(from preceding page)

phorus) to an average of 34 per cent P_2O_5 values.

About half of the proposed material run to a huge rotary kiln will derive from beneficiation. The remaining half will consist of a direct charge of higher grade ore to kiln.

Under this plan, officials say, estimated capacity on the basis of charge to kiln will be in the neighborhood of 1,600 tons daily.

However, the plant will be on a limited production schedule during its initial operating stages.

After roasting in the kiln for removal of carbonaceous elements in ore, the phosphatic material will be charged directly to the 35,000-kw electric furnace for production of elemental phosphorus. This is accomplished through use of a carbon as a sort of catalyst.

Super Phosphoric Acid

The elemental phosphorus will be burned to produce "super phosphoric acid" which will be used in reaction with high grade phosphate rock to produce a high analysis superphosphate for application to soils.

Officials say the high analysis phosphate material will run 50 to 55 per cent P_2O_5 , compared with 40 to 45 per cent for treble super produced through the "wet" process.

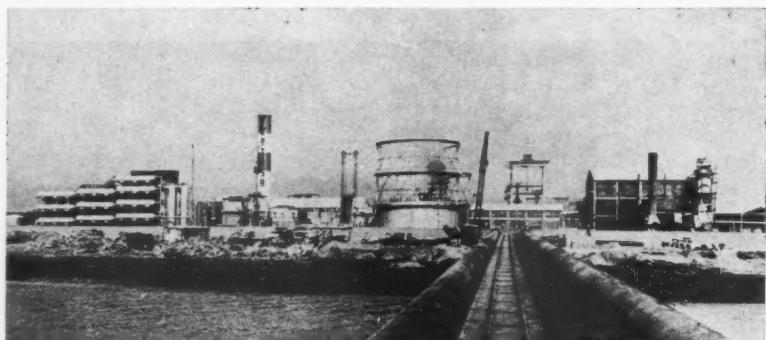
The firm also will continue shipment of raw rock for direct application to soils. A line of phosphoric acids for direct application to soils or introduction into irrigation systems will be produced.

The firm said it will not sell elemental phosphorous to the chemical trade. Elemental will go for output of phosphatic fertilizers, officials explained.

Member co-operatives will brand their own products and complete marketing details.

Included in the group's general marketing area are the east north-central states, west north-central states and Colorado, Utah, Idaho and Oregon, it was announced.

Avery L. Stutts is general manager of Central Farmers and H. C. Roubidoux is production superintendent for the Georgetown plant. The plant employs approximately 400 persons. ▲



Fertisa fertilizer plant at Callao, seen from the sea. At left is cascade of nitric acid absorption tanks. Pipes—350 yards long and 26 inches in diameter, carry sea water to condenser station in thermo-electric generating plant.

*Peru's first
synthetic ammonia
plant goes*

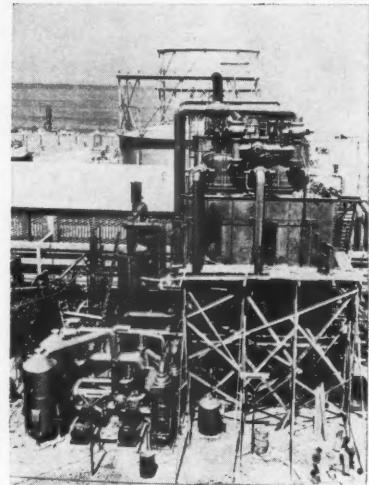
ON STREAM

PERU—traditionally a producer and exporter of organic fertilizers—put on stream in April, at Callao, its first synthetic ammonia plant. Designed and built by Montecatini of Italy and employing a Fauser-Montecatini process, the plant will produce—in addition to ammonium sulfate and ammonium nitrate fertilizers—anhydrous ammonia, nitric acid and ammonium nitrate.

The \$10 million Callao installation will be operated by FERTISA—Fertilizantes Sintéticos S. A.—with headquarters in Lima. Peruvian investors subscribed most of the \$5 million capital, and remaining financing was secured on a long-term loan from an Italian bank.

According to Fertisa, the Callao plant is the first in South America to make hydrogen by partial combustion of fuel oil, using a process developed by Montecatini that is in use in other countries. Northern Peru will supply the fuel oil, available in large quantities in that area. Capacity of the partial combustion plant is 16,500 metric tons per year.

An outstanding feature of the fertilizer grade ammonium nitrate



Fertisa's air fractionation plant

plant is reported to be its use of a granulating device based on revolving disks giving a prilled product. While this technique has been used by European pharmaceutical and candy industries, it is the first time it will be employed in the western hemisphere.

Located ocean-side, the Callao installation will use sea water at the rate of 630,000 gal./hr. to cool the condensers of the thermo-electric power station built on the plant grounds. Based on a 330 day year, the plant will have the following capacity:

20,000 metric tons anhydrous ammonia
54,000 metric tons nitric acid,
53 per cent by weight
35,000 metric tons ammonium nitrate—fertilizer and technical grade
7,500 metric tons ammonium sulfate—fertilizer grade
1,500 metric tons nitric acid, 98 per cent by weight ▲

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All barriers to selling don't originate on the farm

Who is best set up for selling farm chemicals? Would it be the petroleum dealer? Or would it be the feed or grain dealer? Let's face it—there just isn't any such thing as a farm chemicals retailer. As long as pesticides and fertilizers are handled as sidelines along with feed and grain, farm implements, hardware or other lines, the farm chemicals industry will not see any big improvement in marketing.

Should it be considered a compliment to the industry when we read, "Fertilizer is still the farmer's best buy"? We don't think so. Immediately this headline tells you another shocking fact:

There's too much bargaining going on.

It's the same story with pesticides where crash or panic buying is the order of the day.

Fertilizer prices now are 2 per cent below a year ago and seed prices are averaging 7 per cent below. These two production groups are the exceptions in an otherwise high cost picture for the farmer. Building & fencing materials and motor supplies prices are up 1 per cent over last year. Feed prices are up 2 per cent. Motor vehicles are up 3 per cent. Farm real estate and taxes are up 8 per cent. And wage rates are up a staggering 9 per cent!

It appears that in South Carolina fertilizer people are going a good selling job. They sold \$38 million worth of fertilizer and lime to farm operators in 1956—or 21.4 per cent of the total current operating expenses in that year. Comparative data for the country as a whole show that fertilizer and lime expenditures during 1956 were only 8.0 per cent of that year's farm operating expenses.

A recent survey, however, shows that profits might have been higher in South Carolina and perhaps more fertilizer might have been sold if it were not for certain selling practices.

Assistant agricultural economists C. E. Woodall and N. A. Wynn of Clemson College, South Carolina, reported:

"There was quite a variation in prices paid by these farmers for a given analysis. For example, some paid \$52.35 per ton for nitrate of soda while others paid \$61.00 per ton. Those buying 4-10-6 paid from \$30.00 to \$39.50 per ton."

The economists reported that the price differences were due to the following factors:

- 1) Farmers fail to make price comparisons between dealers.
- 2) The farmer's ability to bargain also in-

fluences the price.

3) Many farmers purchase fertilizer on a "Time" payment plan and consequently pay a higher price.

4) The failure of farmers to take advantage of discounts for large purchases such as are possible when they buy all their fertilizer at one time instead of "piecemeal."

A study of fertilizer dealers indicates a great deal of variation in the prices quoted for a particular analysis, too, according to the economists.

The range in price per ton was as great as 40 per cent, this variation being due to such things as 1) brand, 2) minor elements, 3) the individual dealer and 4) location of dealers relative to supply.

Price concessions are the No. 1 evil of the industry, whether the selling is being done in South Carolina or Iowa. This month we're reporting on a study of the fertilizer dealer in Iowa—his knowledge and attitudes toward fertilizer and fertilizer use. (See article on page 24).

Of the 118 dealers in the study, 65 mentioned price cutting as "the competitive practices others dealers are using against them that make their sales most difficult." Answering another query on "dealer's perception of sales techniques being used against them," once again it was price cutting (71 out of 118).

Why can't fertilizer dealers make prices stick? Why can't they use other selling tools to advantage?

Two answers could be: poor attitudes in the first place and inadequate knowledge of fertilizers in the second place.

In Iowa when dealers were asked to indicate the importance of fertilizer use to farmers' crop income, only 26 out of 118 listed it as an "absolute necessity." A total of 60 dealers listed it as "very important." The remainder ranked farmer's use of fertilizer as "important" or "of some importance" to crop income.

It's our guess that dealers would probably react the same way to pesticides.

Too many dealers are still apologizing to farmers for wanting to make a profit on farm chemicals—the same people who *expect* and *get* a handsome profit on their other product lines. It's time the industry destroyed the myth once and for all that "anybody, yes *anybody*, can sell farm chemicals."

GORDON L. BERG

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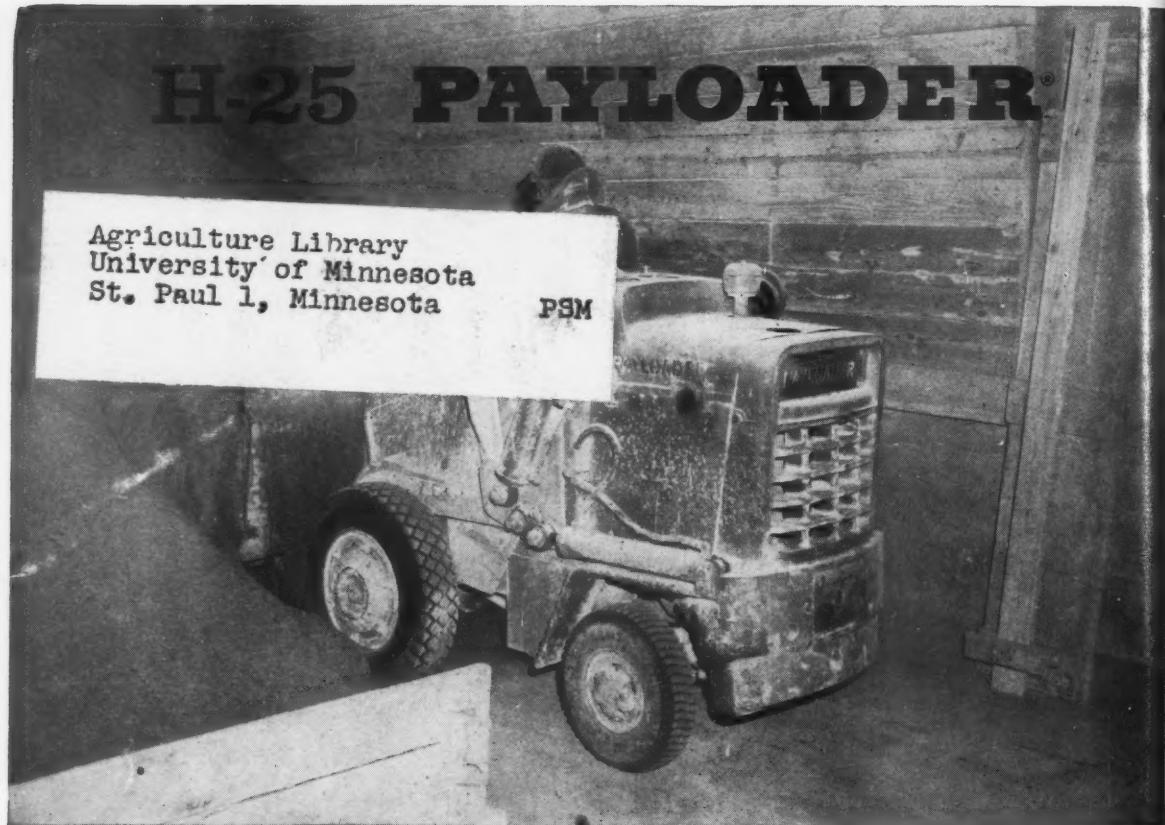


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